Country meeting 'Prevention and control of HPV and HPV related cancers in the Ireland and the UK: lessons learnt and the way forward'
30 November – 1 December 2017
Dublin, Ireland

BACKGROUND DOCUMENT

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Content

Introduction

Objectives of the meeting:

1. Provide an overview of the health care systems and vaccination programs.
2. Review the epidemiological situation of HPV infection and related diseases.
3. Give an overview of the current prevention and control measures on HPV.
4. Discuss the challenges and the progress achieved in HPV prevention.
5. Review the possible implementation of new prevention strategies, control measures and monitoring systems.
6. Discuss the successes, issues and barriers to overcome, and the way forward.

Target audience:

- Projects and organisation representatives involved in HPV control and prevention
- Representatives of health organisations involved in the prevention and control of HPV and/or other health issues
- HPV prevention and control Board advisors

Purpose of the background document

This background document provides an overview of articles related to the meeting and a concise bibliography of speakers. The main purpose of the document is to frame the topics of the country meeting on 'Prevention and control of HPV and HPV related cancers in Ireland and the UK: lessons learnt and the way forward', 29 November – 1 Dcember 2017, Dublin.

The document should not be considered as an an exhaustive report of scientific articles related to the themes of the meeting.

Inclusion of references in this document does not indicate that the Executive Secretariat agrees with the content or correctness of the content. The first objective of this list is to give an overview of what has been published on this topic.

References applicable to different sessions are duplicated in all relevant sessions, abstract of the reference is only added the first time the reference is mentioned.

Part 1: Presentation related references by session

List obtained via speakers and via a PubMed search. The items retrieved via PubMed were added in Endnote (version X7.7.1). The background document contains a selected list of publications based on a manual selection in Endnote.

Session 2 The Health Care Systems in Ireland and the UK

References session 2 via PubMed search:

A PubMed search was performed with the following selection criteria:

1. Ireland AND health care system (title/abstract) in the last 5 years: 20 items retrieved.
2. England AND health care system (title/abstract) in the last 5 years: 53 items retrieved.
3. Northern Ireland AND health care system (title/abstract) in the last 5 years: **1** items retrieved.
4. Wales AND health care system (title/abstract) in the last 5 years: **17** items retrieved.
5. UK AND health care system (title/abstract) in the last 5 years: 63 items retrieved.

The list contains a manual selection of **53** publications relevant to session 1.

Amirthalingam, G., J. White and M. Ramsay (2012). "**Measuring childhood vaccine coverage in England: the role of Child Health Information Systems**." Eurosurveillance **17**(16): 5-10.

Child Health Information Systems (CHISs) are computerised clinical record systems which support a range of health promotion and prevention activities for children, including immunisation and screening. There are a number of different providers of CHISs in England. These systems are managed by child health departments in each local area and not all are interoperable. The establishment of systems which record and maintain accurate information on the entire population is critical to assess vaccination coverage at both national and local levels. These systems should have the flexibility to adapt to a continuously evolving immunisation programme, a mechanism to rapidly feedback to local public health teams for outbreak prevention and control, and the ability to mount a timely response to vaccine safety scares. The ability to schedule (call and recall) immunisation appointments has contributed to improvements in vaccination coverage both in England and elsewhere. While this has been achieved in England through multiple CHISs the development of a single national register would reduce the complexities of maintaining accurate and complete immunisation records for the entire population.

Asaria, M., S. Ali, T. Doran, B. Ferguson, R. Fleetcroft, M. Goddard, P. Goldblatt, M. Laudicella, R. Raine and R. Cookson (2016). "**How a universal health system reduces inequalities: lessons from England**." J Epidemiol Community Health **70**(7): 637-643.

BACKGROUND: Provision of universal coverage is essential for achieving equity in healthcare, but inequalities still exist in universal healthcare systems. Between 2004/2005 and 2011/2012, the National Health Service (NHS) in England, which has provided universal coverage since 1948, made sustained efforts to reduce health inequalities by strengthening primary care. We provide the first comprehensive assessment of trends in socioeconomic inequalities of primary care access, quality and outcomes during this period. METHODS: Whole-population small area longitudinal study based on 32 482 neighbourhoods of approximately 1500 people in England from 2004/2005 to 2011/2012. We measured slope indices of inequality in four indicators: (1) patients per family doctor, (2) primary care quality, (3) preventable emergency hospital admissions and (4) mortality from conditions considered amenable to healthcare. RESULTS: Between 2004/2005 and 2011/2012, there were larger absolute improvements on all indicators in more-deprived neighbourhoods. The modelled gap between the most-deprived and least-deprived neighbourhoods in England decreased by: 193 patients per family doctor (95% CI 173 to 213), 3.29 percentage points of primary care quality (3.13 to 3.45), 0.42 preventable hospitalisations per 1000 people (0.29 to 0.55) and 0.23 amenable deaths per 1000 people (0.15 to 0.31). By 2011/2012, inequalities in primary care supply and quality were almost eliminated, but socioeconomic inequality was still associated with 158 396 preventable hospitalisations and 37 983 deaths amenable to healthcare. CONCLUSIONS: Between 2004/2005 and 2011/2012, the NHS succeeded in substantially reducing socioeconomic inequalities in primary care access and quality, but made only modest reductions in healthcare outcome inequalities.

Bhopal, R. S. (2012). "**The quest for culturally sensitive health-care systems in Scotland: insights for a multi-ethnic Europe**." Journal of Public Health **34**(1): 5-11.

Health systems are serving increasingly ethnically diverse populations. This requires cultural sensitivity/competence. Sharing insights from multi-ethnic countries is important. Insights from Scotland, discussed in this paper, include that the creation of culturally sensitive health systems requires reduction of stigma associated with immigration and immigrants; the wider use of

ethnicity alongside, or instead of, race, country of birth, nationality and immigrant status; prioritization of actions using the concept of inequity; understanding that meeting the needs of minorities improves health systems for everyone; more use of anti-discriminatory laws to drive national policy and locality planning; research to assess needs and effectiveness; evaluation of processes and outcomes; institutional and professional sincerity and confidence, and monitoring that policies are implemented and working. Even when conditions are favourable, as in Scotland, the challenges are many, implementation is tough and timescales long. Scotlands record is, nonetheless, comparatively strong in Europe. Sharing experience across national boundaries should spur on progress globally.

Briggs, A. D. (2013). "**How changes to Irish healthcare financing are affecting universal health coverage**." Health Policy **113**(1-2): 45-49.

In 2010, the World Health Organisation (WHO) published the World Health Report - Health systems financing: the path to universal coverage. The Director-General of the WHO, Dr Margaret Chan, commissioned the report "in response to a need, expressed by rich and poor countries alike, for practical guidance on ways to finance health care". Given the current context of global economic hardship and difficult budgetary decisions, the report offered timely recommendations for achieving universal health coverage (UHC). This article analyses the current methods of healthcare financing in Ireland and their implications for UHC. Three questions are asked of the Irish healthcare system: firstly, how is the health system financed; secondly, how can the health system protect people from the financial consequences of ill-health and paying for health services; and finally, how can the health system encourage the optimum use of available resources? By answering these three questions, this article argues that the Irish healthcare system is not achieving UHC, and that it is unclear whether recent changes to financing are moving Ireland closer or further away from the WHO's ambition for healthcare for all.

Britz, J. B. and M. McKee (2016). "**Charging migrants for health care could compromise public health and increase costs for the NHS**." J Public Health (Oxf) **38**(2): 384-390.

BACKGROUND: This study explores the implications of the UK Department of Health's intention to introduce charging for undocumented migrants for primary health care. METHODS: Following a background review of relevant recent literature, 12 in-depth qualitative interviews were conducted with experts on vulnerable populations in England and/or the English health care system, in collaboration with Doctors of the World UK. Data were analysed qualitatively using thematic coding and framework analysis. RESULTS: Stakeholders were concerned that implementing charging for migrants in England could deter medically necessary treatment, leading to threats to public health and increased health care costs. Interviewees identified potential challenges and opportunities provided by the Health and Social Care Act 2012 to improve health care for migrants. CONCLUSIONS: There are considerable concerns about adverse consequences of implementing charges for undocumented migrants. It will be essential to evaluate the effects of this policy once it is implemented.

Burke, S., S. Thomas, S. Barry and C. Keegan (2014). "**Indicators of health system coverage and activity in Ireland during the economic crisis 2008-2014 - from 'more with less' to 'less with less'**." Health Policy **117**(3): 275-278.

A new Irish government came to power in March 2011 with the most radical proposals for health system reform in the history of the state, including improving access to healthcare, free

GP care for all by 2015 and the introduction of Universal Health Insurance after 2016. All this was to be achieved amidst the most severe economic crisis experienced by Ireland since the 1930s. The authors assess how well the system coped with a downsizing of resources by an analysis of coverage and health system activity indicators. These show a health system that managed 'to do more with less' from 2008 to 2012. They also demonstrate a system that was 'doing more with less' by transferring the cost of care onto people and by significant resource cuts. From 2013, the indicators show a system that has no choice but 'to do less with less' with diminishing returns from crude cuts. This is evident in declining numbers with free care, of hospital cases and home care hours, alongside increased wait-times and expensive agency staffing. The results suggest a limited window of benefit from austerity beyond which cuts and rationing prevail which is costly, in both human and financial terms.

Burke, S. A., C. Normand, S. Barry and S. Thomas (2016). "**From universal health insurance to universal healthcare? The shifting health policy landscape in Ireland since the economic crisis**." Health Policy **120**(3): 235-240.

Ireland experienced one of the most severe economic crises of any OECD country. In 2011, a new government came to power amidst unprecedented health budget cuts. Despite a retrenchment in the ability of health resources to meet growing need, the government promised a universal, single-tiered health system, with access based solely on medical need. Key to this was introducing universal free GP care by 2015 and Universal Health Insurance from 2016 onwards. Delays in delivering universal access and a new health minister in 2014 resulted in a shift in language from 'universal health insurance' to 'universal healthcare'. During 2014 and 2015, there was an absence of clarity on what government meant by universal healthcare and divergence in policy measures from their initial intent of universalism. Despite the rhetoric of universal healthcare, years of austerity resulted in poorer access to essential healthcare and little extension of population coverage. The Irish health system is at a critical juncture in 2015, veering between a potential path to universal healthcare and a system, overwhelmed by years of austerity, which maintains the status quo. This papers assesses the gap between policy intent and practice and the difficulties in implementing major health system reform especially while emerging from an economic crisis.

Carter, A. W., E. Mossialos and A. Darzi (2015). "**A national incident reporting and learning system in England and Wales, but at what cost?**" Expert Rev Pharmacoecon Outcomes Res **15**(3): 365-368.

Recent high-profile failures in healthcare highlight the ongoing need for improvements in patient safety. Moreover, the fiscal challenge facing many health systems has brought the costs and economic efficiencies associated with improving quality (and safety) to bear. Currently, there is a lack of economic evidence underpinning resource allocation decisions in patient safety. Incident reporting systems are considered an important means of addressing these challenges by monitoring incident rates over time, identifying new threats to patient care and ultimately preventing repetition of costly adverse events. Uniquely, for more than a decade, the UK has been developing a National Reporting and Learning System to provide these functions for the English and Welsh health system(s), in addition to pre-existing local systems. The need to evaluate the impact of national incident reporting, and learning systems in terms of effectiveness and efficiency is argued and the methodological challenges that must be considered in an economic analysis are outlined.

Chantler, T., S. Lwembe, V. Saliba, T. Raj, N. Mays, M. Ramsay and S. Mounier-Jack (2016). "**"It's a complex mesh"- how large-scale health system reorganisation affected the delivery of the immunisation programme in England: a qualitative study**." BMC Health Serv Res **16**: 489.

BACKGROUND: The English health system experienced a large-scale reorganisation in April 2013. A national tri-partite delivery framework involving the Department of Health, NHS England and Public Health England was agreed and a new local operational model applied. Evidence about how health system re-organisations affect constituent public health programmes is sparse and focused on low and middle income countries. We conducted an in-depth analysis of how the English immunisation programme adapted to the April 2013 health system reorganisation, and what facilitated or hindered the delivery of immunisation services in this context. METHODS: A qualitative case study methodology involving interviews and observations at national and local level was applied. Three sites were selected to represent different localities, varying levels of immunisation coverage and a range of changes in governance. Study participants included 19 national decision-makers and 56 local implementers. Two rounds of interviews and observations (immunisation board/committee meetings) occurred between December 2014 and June 2015, and September and December 2015. Interviews were audio recorded and transcribed verbatim and written accounts of observed events compiled. Data was imported into NVIVO 10 and analysed thematically. RESULTS: The new immunisation programme in the new health system was described as fragmented, and significant effort was expended to regroup. National tripartite arrangements required joint working and accountability; a shift from the simpler hierarchical pre-reform structure, typical of many public health programmes. New local inter-organisational arrangements resulted in ambiguity about organisational responsibilities and hindered data-sharing. Whilst making immunisation managers responsible for larger areas supported equitable resource distribution and strengthened service commissioning, it also reduced their ability to apply clinical expertise, support and evaluate immunisation providers' performance. Partnership working helped staff adapt, but the complexity of the health system hindered the development of consistent approaches for training and service evaluation. CONCLUSION: The April 2013 health system reorganisation in England resulted in significant fragmentation in the way the immunisation programme was delivered. Some of this was a temporary by-product of organisational change, other more persistent challenges were intrinsic to the complex architecture of the new health system. Partnership working helped immunisation leaders and implementers reconnect and now the challenge is to assess how inter-agency collaboration can be strengthened.

Connolly, S. and M. A. Wren (2017). "**Unmet healthcare needs in Ireland: Analysis using the EU-SILC survey**." Health Policy **121**(4): 434-441.

The analysis used the 2013 Survey of Income and Living Conditions to examine the extent and causes of unmet need for healthcare services in Ireland. The analysis found that almost four per cent of participants reported an unmet need for medical care. Overall, lower income groups, those with poorer health status and those without free primary care and/or private insurance were more likely to report an unmet healthcare need. The impact of income on the likelihood of reporting an unmet need was particularly strong for those without free primary care and/or private insurance, suggesting a role for the health system in eradicating income based inequalities in unmet need. Factors associated with the healthcare system - cost and waiting lists - accounted for the majority of unmet needs. Those with largely free public healthcare entitlement were more likely than all other eligibility categories to report that their unmet need was due to waiting lists (rather than cost). While not possible to explicitly examine in this

analysis, it is probable that unmet need due to cost is picking up on the relatively high out-of-pocket payments for primary care for those who must pay for GP visits; while unmet need due to waiting is identifying the relatively long waiting times within the acute hospital sector for those within the public system.

Conrad, D. (2014). "**Over the rainbow: delivering on the promise of England's new public health system**." J Epidemiol Community Health **68**(1): 3-3.

Coughlan, D., B. Turner and A. Trujillo (2013). "**Motivation for a health-literate health care system--does socioeconomic status play a substantial role? Implications for an Irish health policymaker**." J Health Commun **18 Suppl 1**: 158-171.

In this article, the authors argue that the association between socioeconomic status and motivation for a health-literate health care system has implications for health policymakers. As Ireland now undergoes health care reform, the authors pose the question, "Should policymakers invest in health literacy as predominately a health inequalities or a public health issue?" Data from 2 cohorts of the Survey of Lifestyle, Attitudes and Nutrition (1998 and 2002) were used to construct a motivation for a health-literate health care system variable. Multivariate logistic regressions and concentration curves were used in the analyses of this variable. Of the 12,513 pooled respondents, 46% sought at least 1 attribute on a health-literate health care system. No discernible trend emerged from the main independent variables-social class grouping, medical card eligibility, level of education, and employment-in the regression analyses. The concentration curve, for 2002 data, graphically showed that the motivation for a health-literate health care system is spread equally across the income distribution. This analysis and more recent data suggest that health literacy in Ireland should be viewed predominately as a public health issue with a policy focus at a system level.

Cresswell, K., P. Smith, C. Swainson, A. Timoney and A. Sheikh (2016). "**Establishing data-intensive healthcare: the case of Hospital Electronic Prescribing and Medicines Administration systems in Scotland**." J Innov Health Inform **23**(3): 842.

BACKGROUND: Creating learning health systems, characterised by the use and repeated reuse of demographic, process and clinical data to improve the safety, quality and efficiency of care, is a key aim in realising the potential benefits and efficiency savings associated with the implementation of health information technology. OBJECTIVES: We sought to investigate stakeholder perspectives on and experiences of the implementation of hospital electronic prescribing and medicines administration (HEPMA) systems in Scotland and use these to inform political decisions on approaches to promoting the use and reuse of digitised prescribing and medication administration data in order to improve care processes and outcomes.Methods We identified and recruited key national stakeholders involved in implementing and/or using HEPMA data from generic and specialty systems. These included representatives from healthcare settings (i.e. doctors, pharmacists and nurses), managers of existing national databases, policy makers, healthcare analytics companies, system suppliers and patient representatives. We conducted multi-disciplinary focus group discussions, audio-recorded these, transcribed data verbatim and thematically analysed the transcripts with the help of NVivo10. In analysing the data, we drew on theoretical and previous empirical work on information infrastructures. RESULTS: We identified the following key themes: 1) micro-factors - usability of systems and motivating users to input data; 2) meso-factors - developing technical and organisational infrastructures to facilitate the aggregation of data; and 3) macro-factors -

facilitating interoperability and data reuse at larger scales to ensure that data are effectively generated and used. CONCLUSIONS: This work is relevant not only to countries in the early stages of data strategy development but also to countries aiming to aggregate data at national levels. An overall shared vision of a learning health system at individual, organisational and national levels can help to catalyse such data-intensive transformational efforts.

Daniels, T., I. Williams, S. Robinson and K. Spence (2013). "**Tackling disinvestment in health care services. The views of resource allocators in the English NHS**." J Health Organ Manag **27**(6): 762-780.

PURPOSE: The aims of this paper are to explore the experiences of budget holders within the English National Health Service (NHS), in their attempts to implement programmes of disinvestment, and to consider factors which influence the success (or otherwise) of this activity. DESIGN/METHODOLOGY/APPROACH: Between 24 January and 15 March 2011 semi-structured, telephone interviews were conducted with representatives of 12 Primary Care Trusts in England. Interviews focussed on: understanding of the term "disinvestment"; current activities, and perceived determinants of successful disinvestment decision making and implementation. Data were organised into themes according to standard qualitative data coding practices. FINDINGS: Findings indicate that experiences of disinvestment are varied and that organisations are currently adopting a range of approaches. There are a number of apparently influential determinants of disinvestment which relate to both health system features and organisational characteristics. According to the experiences of the interviewees, many of the easier disinvestment options have now been taken and more ambitious plans, which require wider engagement and more thorough project management, will be required in the future. RESEARCH LIMITATIONS/IMPLICATIONS: Findings from the research suggest that issues around understanding and usage of disinvestment terminology should be addressed and that a more in-depth and ethnographic research agenda will be of most value in moving forward both the theory and practice of disinvestment. ORIGINALITY/VALUE: This research suggests that, in the English NHS at least, there is a disjuncture between common usage of the term "disinvestment" and the way that it has previously been understood by the wider research community. In addition to this, the research also highlights a broader range of potential determinants of disinvestment than are considered in the extant literature.

Doyle, Y. and P. Johnstone (2016). "**Health benefits from devolution in England: international lessons**." Postgrad Med J **92**(1087): 282-285.

The Chancellor of the Exchequer's recent announcements to devolve decision making power from Whitehall to 30 English regions provide a challenge to use devolution to deliver more favourable health outcomes. However evaluation of devolved health models internationally is scarce, because it is rarely considered. Evidence from countries with long-standing experience of devolution finds that the best approaches are holistic, seeking fiscal freedoms to sustain the environment, promote health, well-being and citizen engagement. Overall, international outcomes are mixed, with some evidence of greater efficiency of care delivery but little hard evidence of better clinical outcomes or health status. Handling specialised services in a devolved health system is challenging. Regulation by national authorities is important to avoid gaming of the system by providers. Information from the devolved area is important in demonstrating equitable access. We present an evaluation framework and recommend that evaluation continues through governance of these deals during implementation.

Duncan, P., M. R. Bertolozzi, S. Cowley, E. Y. Egry, A. M. Chiesa and F. O. de Siqueira Franca (2015). ""**Health for All" in England and Brazil?**" Int J Health Serv **45**(3): 545-563.

This article discusses the achievements and challenges that England and Brazil face in relation to their capacity to address inequalities in health through health promotion and public health policies. Using secondary data (policy texts and related documents), this article contextualizes, explains, and critically appraises health promotion and public health efforts for the reduction of inequalities in health in the 2 countries. A historic documentary analysis was undertaken, with hermeneutics as the methodological framework. The global economic crisis has prompted the so-called developed economies of Europe to reconsider their economic and social priorities. England represents a state facing this kind of challenge. Equally, Brazil is assuming new positions not only on the world stage but also in terms of the relationship it has with its citizens and the priorities it has for state welfare. The United Kingdom continues to finance a health care system allowing universal access in the form of the National Health Service, and state concern about the public health task of reducing inequalities has recently been underlined in policy. For Brazil, although there have been recent achievements related to population access to healthcare, challenges continue, especially with regard to the quality of care.

Dusheiko, M. (2014). "**Patient choice and mobility in the UK health system: internal and external markets**." Dev Health Econ Public Policy **12**: 81-132.

The National Health Service (NHS) has been the body of the health care system in the United Kingdom (UK) for over 60 years and has sought to provide the population with a high quality service free of user charges for most services. The information age has seen the NHS rapidly transformed from a socialist, centrally planned and publicly provided system to a more market based system orientated towards patients as consumers. The forces of globalization have provided patients in the UK with greater choice in their health care provision, with NHS treatment now offered from any public or approved private provider and the possibility of treatment anywhere in the European Economic Area (EEA) or possibly further. The financial crisis, a large government deficit and austerity public spending policies have imposed a tight budget constraint on the NHS at a time of increasing demand for health care and population pressure. Hence, further rationing of care could imply that patients are incentivised to seek private treatment outside the constraints of the NHS, where the possibility of much greater choice exists in an increasingly globally competitive health care market. This chapter examines the evidence on the response of patients to the possibilities of increased choice and mobility within the internal NHS and external overseas health care markets. It also considers the relationships between patient mobility, health care provision and health policy. Patients are more mobile and willing to travel further to obtain better care outcomes and value for money, but are exposed to greater risk.

Eason, K. and P. Waterson (2013). "**The implications of e-health system delivery strategies for integrated healthcare: lessons from England**." Int J Med Inform **82**(5): e96-e106.

PURPOSE: This paper explores the implications that different technical strategies for sharing patient information have for healthcare workers and, as a consequence, for the extent to which these systems provide support for integrated care. METHODS: Four technical strategies were identified and the forms of coupling they made with healthcare agencies were classified. A study was conducted in England to examine the human and organizational implications of systems implemented by these four strategies. Results were used from evaluation reports of two systems delivered as part of the NPfIT (National Programme for Information Technology) and

from user responses to systems delivered in two local health communities in England. In the latter study 40 clinical respondents reported the use of systems to support integrated care in six healthcare pathways. RESULTS: The implementation of a detailed care record system (DCRS) in the NPfIT was problematic because it could not meet the diverse needs of all healthcare agencies and it required considerable local customization. The programme evolved to allow different systems to be delivered for each local health community. A national Summary Care Record (SCR) was implemented but many concerns were raised about wide access to confidential patient information. The two technical strategies that required looser forms of coupling and were under local control led to wide user adoption. The systems that enabled data to be transferred between local systems were successfully used to support integrated care in specific healthcare pathways. The portal approach gave many users an opportunity to view patient data held on a number of databases and this system evolved over a number of years as a result of requests from the user community. CONCLUSIONS: The UK national strategy to deliver single shared database systems requires tight coupling between many users and has led to poor adoption because of the diverse needs of healthcare agencies. Sharing patient information has been more successful when local systems have been developed to serve particular healthcare pathways or when separate databases are viewable through a portal. On the basis of this evidence technical strategies that permit the local design of tight coupling are necessary if information systems are to support integrated care in healthcare pathways.

Fahy, N., T. Hervey, S. Greer, H. Jarman, D. Stuckler, M. Galsworthy and M. McKee (2017). "**How will Brexit affect health and health services in the UK? Evaluating three possible scenarios**." Lancet.

The process of leaving the European Union (EU) will have profound consequences for health and the National Health Service (NHS) in the UK. In this paper, we use the WHO health system building blocks framework to assess the likely effects of three scenarios we term soft Brexit, hard Brexit, and failed Brexit. We conclude that each scenario poses substantial threats. The workforce of the NHS is heavily reliant on EU staff. Financing of health care for UK citizens in the EU and vice versa is threatened, as is access to some capital funds, while Brexit threatens overall economic performance. Access to pharmaceuticals, technology, blood, and organs for transplant is jeopardised. Information used for international comparisons is threatened, as is service delivery, especially in Northern Ireland. Governance concerns relate to public health, competition and trade law, and research. However, we identified a few potential opportunities for improvement in areas such as competition law and flexibility of training, should the UK Government take them. Overall, a soft version of Brexit would minimise health threats whereas failed Brexit would be the riskiest outcome. Effective parliamentary scrutiny of policy and legal changes will be essential, but the scale of the task risks overwhelming parliament and the civil service.

Fitzgerald, L. and G. Harvey (2015). "**Translational networks in healthcare? Evidence on the design and initiation of organizational networks for knowledge mobilization**." Soc Sci Med **138**: 192-200.

International attention has focussed on the variations between research evidence and practice in healthcare. This prompted the creation of formalized translational networks consisting of academic-service partnerships. The English Collaborations for Leadership in Applied Health Research and Care (CLAHRCs) are one example of a translational network. Using longitudinal, archival case study data from one CLAHRC over a 3-year period (2008-11), this article explores the relationship between organizational form and the function(s) of a translational network. The article focuses on the research gaps on the effective structures and appropriate governance to

support a translational network. Data analysis suggested that the policy of setting up translational networks is insufficient of itself to produce positive translational activity. The data indicate that to leverage the benefits of the whole network, attention must be paid to devising a structure which integrates research production and use and facilitates lateral cross-disciplinary and cross-organizational communication. Equally, appropriate governance arrangements are necessary, particularly in large, multi-stakeholder networks, where shared governance may be questionable. Inappropriate network structure and governance inhibits the potential of the translational network. Finally, the case provides insights into the movement of knowledge within and between network organizations. The data demonstrate that knowledge mobilization extends beyond knowledge translation; knowledge mobilization includes the negotiated utilization of knowledge - a balanced power form of collaboration. Whilst much translational effort is externally focused on the health system, our findings highlight the essential need for the internal negotiation and mobilization of knowledge within academia.

Frank, J., C. Bromley, L. Doi, M. Estrade, R. Jepson, J. McAteer, T. Robertson, M. Treanor and A. Williams (2015). "**Seven key investments for health equity across the lifecourse: Scotland versus the rest of the UK**." Soc Sci Med **140**: 136-146.

While widespread lip service is given in the UK to the social determinants of health (SDoH), there are few published comparisons of how the UK's devolved jurisdictions 'stack up', in terms of implementing SDoH-based policies and programmes, to improve health equity over the life-course. Based on recent SDoH publications, seven key societal-level investments are suggested, across the life-course, for increasing health equity by socioeconomic position (SEP). We present hard-to-find comparable analyses of routinely collected data to gauge the relative extent to which these investments have been pursued and achieved expected goals in Scotland, as compared with England and Wales, in recent decades. Despite Scotland's longstanding explicit goal of reducing health inequalities, it has recently been doing slightly better than England and Wales on only one broad indicator of health-equity-related investments: childhood poverty. However, on the following indicators of other 'best investments for health equity', Scotland has not achieved demonstrably more equitable outcomes by SEP than the rest of the UK: infant mortality and teenage pregnancy rates; early childhood education implementation; standardised educational attainment after primary/secondary school; health care system access and performance; protection of the population from potentially hazardous patterns of food, drink and gambling use; unemployment. Although Scotland did not choose independence on September 18th, 2014, it could still (under the planned increased devolution of powers from Westminster) choose to increase investments in the underperforming categories of interventions for health equity listed above. However, such discussion is largely absent from the current post-referendum debate. Without further significant investments in such policies and programmes, Scotland is unlikely to achieve the 'healthier, fairer society' referred to in the current Scottish Government's official aspirations for the nation.

Gadsby, E. W., S. Peckham, A. Coleman, D. Bramwell, N. Perkins and L. M. Jenkins (2017). "**Commissioning for health improvement following the 2012 health and social care reforms in England: what has changed?**" BMC Public Health **17**(1): 211.

BACKGROUND: The wide-ranging program of reforms brought about by the Health and Social Care Act (2012) in England fundamentally changed the operation of the public health system, moving responsibility for the commissioning and delivery of services from the National Health Service to locally elected councils and a new national public health agency. This paper explores

the ways in which the reforms have altered public health commissioning. METHODS: We conducted multi-methods research over 33 months, incorporating national surveys of Directors of Public Health and local council elected members at two time-points, and in-depth case studies in five purposively selected geographical areas. RESULTS: Public health commissioning responsibilities have changed and become more fragmented, being split amongst a range of different organisations, most of which were newly created in 2013. There is much change in the way public health commissioning is done, in who is doing it, and in what is commissioned, since the reforms. There is wider consultation on decisions in the local council setting than in the NHS, and elected members now have a strong influence on public health prioritisation. There is more (and different) scrutiny being applied to public health contracts, and most councils have embarked on wide-ranging changes to the health improvement services they commission. Public health money is being used in different ways as councils are adapting to increasing financial constraint. CONCLUSIONS: Our findings suggest that, while some of the intended opportunities to improve population health and create a more joined-up system with clearer leadership have been achieved, fragmentation, dispersed decision-making and uncertainties regarding funding remain significant challenges. There have been profound changes in commissioning processes, with consequences for what health improvement services are ultimately commissioned. Time (and further research) will tell if any of these changes lead to improved population health outcomes and reduced health inequalities, but many of the opportunities brought about by the reforms are threatened by the continued flux in the system.

Greaves, F., A. A. Laverty, U. Pape, A. Ratneswaren, A. Majeed and C. Millett (2015). "**Performance of new alternative providers of primary care services in England: an observational study**." J R Soc Med **108**(5): 171-183.

OBJECTIVES: Health system reforms in England are opening broad areas of clinical practice to new providers of care. As part of these reforms, new entrants--including private companies--have been allowed into the primary care market under 'alternative provider of medical services' contracting mechanisms since 2004. The characteristics and performance of general practices working under new alternative provider contracts are not well described. We sought to compare the quality of care provided by new entrant providers to that provided by the traditional model of general practice. DESIGN: Open cohort study of English general practices. We used linear regression in cross-sectional and time series analyses, adjusting for practice and population characteristics, to compare quality in practices using alternative provider contracts to traditional practices. We created regression models using practice fixed effects to estimate the impact of practices changing to the new contract type. SETTING: The English National Health Service. PARTICIPANTS: All general practices open from 2008/2009 to 2012/2013. MAIN OUTCOME MEASURES: Seventeen established quality indicators--covering clinical effectiveness, efficiency, access and patient experience. RESULTS: In total, 4.1% (347 of 8300) of general practices in England were run by alternative contract providers. These practices tended to be smaller, and serve younger, more diverse and more deprived populations than traditional providers. Practices run by alternative providers performed worse than traditional providers on 15 of 17 indicators after adjusting for practice and population characteristics ($p < 0.01$ for all). Switching to a new alternative provider contract did not result in improved performance. CONCLUSIONS: The introduction of new alternative providers to deliver primary care services in England has not led to improvements in quality and may have resulted in worse care. Regulators should ensure that new entrants to clinical provider markets are performing to adequate standards and at least as well as traditional providers.

Greer, S. L., E. A. Stewart, I. Wilson and P. D. Donnelly (2014). "**Victory for volunteerism? Scottish health board elections and participation in the welfare state**." Soc Sci Med **106**: 221-228.

This paper presents findings from a multimethod study of pilot elections held to choose members of health boards in the National Health Service in Scotland. We begin by proposing that much current public involvement practice is dominated by a volunteerist model, in which members of the public with time and skills to offer play essentially supportive and non-challenging roles within health care organizations. This model contrasts sharply with the adversarial, political model of electoral democracy. Nonetheless, drawing on a postal survey of voters, non-participant observation of Boards, and semi-structured interviews with candidates, elected Board members and other stakeholders, we demonstrate that the introduction of elections did not overcome the volunteerist slant of current public involvement with health care organizations. Far from offering a 'quick fix' for policymakers seeking to ensure accountability of health care organizations, elections may produce remarkably similar outcomes to existing mechanisms of public involvement.

Gulland, A. (2017). "**UK has best health system in developed world, US analysis concludes**." Bmj **358**: j3442.

Hardcastle, A. C., L. T. A. Mounce, S. H. Richards, M. O. Bachmann, A. Clark, W. E. Henley, J. L. Campbell, D. Melzer and N. Steel (2015). **Health Services and Delivery Research**. The dynamics of quality: a national panel study of evidence-based standards. Southampton (UK), NIHR Journals Library

Shortfalls in the receipt of recommended health care have been previously reported in England, leading to preventable poor health. To assess changes over 6 years in the receipt of effective health-care interventions for people aged 50 years or over in England with cardiovascular disease, depression, diabetes or osteoarthritis; to identify how quality varied with participant characteristics; and to compare the distribution of illness burden in the population with the distributions of diagnosis and treatment. Information on health-care quality indicators and participant characteristics was collected using face-to-face structured interviews and nurse visits in participants' homes by the English Longitudinal Study of Ageing in 2004-5, 2006-7, 2008-9 and 2010-11. A total of 16,773 participants aged 50 years or older were interviewed at least once and 5114 were interviewed in all four waves; 5404 reported diagnosis of one or more of four conditions in 2010-11. Percentage of indicated health care received by eligible participants for 19 quality indicators: seven for cardiovascular disease, three for depression, five for diabetes and four for osteoarthritis, and condition-level quality indicator achievement, including achievement of a bundle of three diabetes indicators. Changes in quality indicator achievement over time and variations in quality with participant characteristics were tested with Pearson's chi-squared test and logistic regression models. The size of inequality between the hypothetically wealthiest and poorest participants, for illness burden, diagnosis and treatment,

was estimated using slope indices of wealth inequality. Achievement of indicators for cardiovascular disease was 82.7% [95% confidence interval (CI) 79.9% to 85.5%] in 2004-5 and 84.2% (95% CI 82.1% to 86.2%) in 2010-11, for depression 63.3% (95% CI 57.6% to 69.0%) and 59.8% (95% CI 52.4% to 64.3%), for diabetes 76.0% (95% CI 74.1% to 77.8%) and 76.5% (95% CI 74.8% to 78.1%), and for osteoarthritis 31.2% (95% CI 28.5% to 33.8%) and 35.6% (95% CI 34.2% to 37.1%). Achievement of the diabetes care bundle was 67.8% (95% CI 64.5% to 70.9%) in 2010-11. Variations in quality by participant characteristics were generally small. Diabetes indicator achievement was worse in participants with cognitive impairment [odds ratio (OR) 0.5, 95% CI 0.4 to 0.7] and better in those living alone (OR 1.7, 95% CI 1.3 to 2.0). Hypertension care was better for those aged over 74 years (vs. 50-64 years) (OR 3.2, 95% CI 2.0 to 5.3). Osteoarthritis care was better for those with severe (vs. mild) pain (OR 1.8, 95% CI 1.4 to 2.2), limiting illness (OR 1.8, 95% CI 1.5 to 2.1), and obesity (OR 1.6, 95% CI 1.2 to 2.0). Previous non-achievement of the diabetes care bundle was the biggest predictor of non-achievement 2 years later (OR 3.3, 95% CI 2.2 to 4.7). Poorer participants were always more likely than wealthier participants to have illness burden (statistically significant OR 3.9 to 16.0), but not always more likely to be diagnosed or receive treatment (0.2 to 5.3). Shortfalls in quality of care for these four conditions have persisted over 6 years, with only half of the level of indicated health care achieved for osteoarthritis, compared with the other three conditions. Quality for osteoarthritis improved slightly over time but remains poor. The relatively high prevalence of specific illness burden in poorer participants was not matched by an equally high prevalence of diagnosis or treatment, suggesting that barriers to equity may exist at the stage at diagnosis. Further research is needed into the association between quality and health system characteristics at the level of clinicians, general practices or hospitals, and regions. Linkage to routinely collected data could provide information on health service characteristics at the individual patient level. The National Institute for Health Research Health Services and Delivery Research programme.

Hennessey, D. B., C. Lynn, H. Templeton, K. Chambers and C. Mulholland (2013). "**The PSA tracker: a computerised health care system initiative in Northern Ireland**." Ulster Med J **82**(3): 146-149.

INTRODUCTION: [corrected] The follow-up of men with prostate cancer forms a large part of many urologists workload. However, a rising PSA usually announces disease progression long before any clinically apparent symptom. Thus, many men can be safely monitored with PSA measurement alone. To facilitate this process, PSA tracking software was introduced to remotely monitor PSA results, minimising the work required for follow-up. METHODS: Stable prostate cancer patients were into the PSA tracker. When each PSA test was performed, the result was reviewed. The program automatically generated patient reminder letters, summary reports for clinic use and all correspondence to patients and primary care physicians. RESULTS: Since 2006, 65 patients have been entered into the PSA tracker. Median age was 81 (57-94) years. 274 outpatient appointments have been saved, indicating a potential saving of pound32,000. More importantly it increased the capacity of the department to assess new patients. For the individual patient, the system has saved them, a median of 3 appointments each. CONCLUSION: Remote follow-up of prostate cancer is associated with significant savings for both healthcare organisations and individual patients. This example, further demonstrates the benefits of implanting healthcare software for patients and hospitals.

Hill, H., R. Macey and P. Brocklehurst (2017). "**A Markov model assessing the impact on primary care practice revenues and patient's health when using mid-level providers, lesson learned from the United Kingdom**." J Public Health Dent.

OBJECTIVE: To evaluate the cost-effectiveness of using mid-level providers for dental "check-up" examinations and the treatment of caries in different NHS settings in the United Kingdom. Mid-level providers are a broad category that describes non-dentist members of dental teams. This study focused on the potential use of Dental Hygiene Therapists undertaking dental "check-up" examinations and simple restorative treatment, instead of dentists. METHODS: A Markov model was used to construct the natural history of caries development in adults that visit a dental practice every six months over a five-year period. Three cost perspectives are taken: those borne to dental healthcare providers in England and Wales, Northern Ireland and Scotland. These represent three separate forms of retrospective payment system that are currently in use in the United Kingdom. The cost outcome was the average amount of retained practice earnings required to provide healthcare per patient visit. The health outcome was the average length of time in a cavity-free state and the cost-effectiveness outcome was incremental cost for six months in a cavity-free state. RESULTS: No statistical difference was found between dentists and mid-level providers in the length of time in a cavity-free state but the use of the latter saved money in all three NHS health system jurisdictions. This ranged from pound7.85 (England and Wales) to pound9.16 (Northern Ireland) per patient visit ($10.20 to $11.90, respectively) meaning the incremental cost for six month in a cavity-free state ranged from pound261.67 ($339.93) in England and Wales to pound305.33 ($369.68) in Northern Ireland. Further, changes in baseline assumptions and parameter values did not change mid-level providers being the dominant service intervention. CONCLUSION: In a time of limited funds for dental services, these results suggest that resources in public funded systems could be saved using mid-level providers in dental practices, without any health risk to patients or capital investment.

Horner, A. (2016). "**'It is important to value people's contributions'**." Emerg Nurse **24**(4): 41.

What is your job? I lead a programme supporting trusts to improve unscheduled care for patients in Northern Ireland. I support implementation of best practice across the health system.

Karlsberg Schaffer, S., J. Sussex, D. Hughes and N. Devlin (2016). "**Opportunity costs and local health service spending decisions: a qualitative study from Wales**." BMC Health Serv Res **16**: 103.

BACKGROUND: All health care systems face the need to find the resources to meet new demands such as a new, cost-increasing health technology. In England and Wales, when a health technology is recommended by the National Institute for Health and Care Excellence (NICE), the National Health Service (NHS) is mandated to provide the funding to accommodate it within three months of publication of the recommendation. Identifying what, in practice, is foregone when new cost-increasing technologies are introduced is important for understanding the effects of health technology assessment (HTA) decisions on the NHS or any other health care system. Our objective was to investigate how in practice local NHS commissioners in Wales accommodated financial "shocks" arising from technology appraisals (TAs) issued by NICE and from other cost pressures. METHODS: Semi-structured interviews were conducted with Finance Directors and Medical Directors from all seven Local Health Boards (LHBs) in NHS Wales. These interviews covered prioritisation processes, as well as methods of financing NICE TAs and other financial shocks at each LHB. We then undertook a systematic identification of themes and topics from the information recorded. The study relates to the period October 2010 to March

2013. RESULTS: The financial impact of NICE TAs is generally anticipated and planned for in advance and the majority of LHBs have contingency funds available to cope with these and other financial shocks within-period. Efficiency savings (defined as reductions in costs with no assumed reductions in quality) were a source of funds for cost pressures of all kinds. Service displacements were not linkable to particular NICE TAs and there appears to be a general lack of explicit prioritisation activities. The Welsh Government has, on occasion, explicitly or implicitly acted as the funder of last resort. CONCLUSIONS: Services may be displaced as part of a response to the cumulative impact of all types of cost pressures, including cost-increasing health technologies recommended by NICE, but such displacements were not direct responses to the publication of individual NICE TAs. The additional cost pressure represented by a new NICE TA is likely to be accommodated at least partly by greater efficiency and increased expenditure rather than displacement of services.

Layte, R. and A. Nolan (2015). "**Income-related inequity in the use of GP services by children: a comparison of Ireland and Scotland**." Eur J Health Econ **16**(5): 489-506.

Equity of access to health care is a key component of national and international health policy, with most countries subscribing to the principle that health care should be allocated on the basis of need, rather than ability to pay or other criteria. The issue of health care entitlements for children is particularly pertinent given the strong causal links that have been demonstrated between eligibility for free care, utilisation and health outcomes. The Irish health care system is unusual in requiring the majority of the population to pay the full out-of-pocket cost of GP care. In contrast, all Scottish residents are entitled to free GP care at the point of use. This difference in public health care entitlements between Ireland and Scotland allows us to examine the impact of differences in financing structures on equity in GP care. In this paper, we use data from two nationally representative surveys of children in Ireland and Scotland to examine the degree of income-related inequity in the utilisation of GP services in both countries. We find that while the distribution of GP care is significantly pro-poor in Ireland, even after adjustment for health need, there is little or no significant inequity in GP utilisation among Scottish children. However, focusing just on children who pay the full price of GP care in Ireland, we find some evidence for a significant pro-rich distribution of GP visits. These results reflect the particular structure of health care entitlements that exist in two systems.

Legido-Quigley, H., V. Saliba and M. McKee (2015). "**Exploring the experiences of EU qualified doctors working in the United Kingdom: a qualitative study**." Health Policy **119**(4): 494-502.

This qualitative study of 23 doctors from other EU member states working in the UK highlights that, contrary to media reports, doctors from other member states working in the UK were well prepared and their main motivation to migrate was to learn new skills and experience a new health care system. Interviewees highlighted some aspects of their employment that work well and others that need improving. Some interviewees reported initially having language problems, but most noted that this was resolved after a few months. These doctors overwhelmingly reported having very positive experiences with patients, enjoying a NHS structure that was less hierarchical structure than in their home systems, and appreciating the emphasis on evidence-based medicine. Interviewees mostly complained about the lack of cleanliness of hospitals and gave some examples of risk to patient safety. Interviewees did not experience discrimination other than some instances of patronising and snobbish behaviour. However, a few believed that their nationality was a block to achieving senior positions. Overall, interviewees reported having enjoyable experiences with patients and appreciating what the NHS had to offer.

Lichtner, V., R. Hibberd and T. Cornford (2016). "**Networking Hospital ePrescribing: A Systemic View of Digitalization of Medicines' Use in England**." Stud Health Technol Inform **225**: 73-77.

Medicine management is at the core of hospital care and digitalization of prescribing and administration of medicines is often the focus of attention of health IT programs. This may be conveyed to the public in terms of the elimination of paper-based drug charts and increased readability of doctors' prescriptions. Based on analysis of documents about hospital medicines supply and use (including systems' implementation) in the UK, in this conceptual paper electronic prescribing and administration are repositioned as only one aspect of an important wider transformation in medicine management in hospital settings, involving, for example, procurement, dispensing, auditing, waste management, research and safety vigilance. Approaching digitalization from a systemic perspective has the potential to uncover the wider implications of this transformation for patients, the organization and the wider health care system.

Lozano, M., G. Meardi and A. Martin-Artiles (2015). "**International recruitment of health workers: British lessons for Europe? Emerging concerns and future research recommendations**." Int J Health Serv **45**(2): 306-319.

Immigration as a solution to staff and skill shortages in the health system is increasingly on the agenda in the European Union. This article highlights the related social and policy dilemmas by comparing a new destination country with an old destination country: Spain and the United Kingdom. After describing the challenges met by the United Kingdom, we ask how well-prepared Spain is to face the same issues. In particular, attention is paid to the occupational mobility of health workers after entry and to how immigration as a staffing solution poses new political and social challenges. Through a review of background information regarding the immigration of health workers in the two countries and the preliminary analysis of 15 exploratory interviews, we aim to identify the primary trends and key concerns for future analysis. Although our interviews only allow us to draw tentative conclusions, they do highlight emerging issues to be explored in the near future. Our conclusions show that many of the problems traditionally encountered in the United Kingdom are now emerging in Spain, suggesting scope for further collaboration among government, employers, and other stakeholders across the European Union.

Matsuda, S. (2013). "**[Health system reform in the United Kingdom]**." J uoeh **35**(4): 279-289.

How to control the increasing health expenditures is a common problem in the developed countries. The main causes of this increase are ageing of the society and medical innovation. The UK government has introduced a market oriented health reform in order to balance the increasing expenditures and the quality of care. For example, they have introduced the GP Fundholding, Private Financial Initiative (PFI) for construction of public hospital, and personal budget system (a patient owns a budget for buying health services in the deregulated market). However, there is little evidence indicating the effectiveness of these programs. On the other hand, it is important to strengthen the labor policy in order to maintain the social security system. For example, programs for increasing the employment rate and those for increasing productivity work sharing are such policies. From this viewpoint, the EU countries have introduced a series of active employment policies, i.e., job training for unemployed persons and work sharing. Furthermore, as other authors report in other articles of this volume, the government of the UK has introduced the Fit for Work (FFW) program that intends to medically

support workers.

McCarthy, M. (2014). "**Health system report ranks UK first, US last**." Bmj **348**: g4080.

Middleton, J. (2017). "**Public health in England in 2016-the health of the public and the public health system: a review**." Br Med Bull **121**(1): 31-46.

Background: This article describes the current state of the health of the public in England and the state of the public health professional service and systems. Sources of data: Data sources are wide ranging including the Global Burden of Disease, the Commonwealth Fund and Public Health England reports. Areas of agreement: There is a high burden of preventable disease and unacceptable inequalities in England. There is considerable expectation that there are gains to be made in preventing ill health and disability and so relieving demand on healthcare. Areas of controversy: Despite agreement on the need for prevention, the Government has cut public health budgets by a cumulative 10% to 2020. Public health professionals broadly supportive of remaining in the EU face an uphill battle to retain health, workplace and environmental protections following the 'Leave' vote. Growing points and areas timely for developing research: There is revitalized interest in air pollution. Extreme weather events are testing response and organizational skills of public health professionals and indicating the need for greater advocacy around climate change, biodiversity and protection of ecological systems. Planetary health and ecological public health are ideas whose time has certainly come.

Montgomery, H. E., A. Haines, N. Marlow, G. Pearson, M. G. Mythen, M. P. W. Grocott and C. Swanton (2017). "**The future of UK healthcare: problems and potential solutions to a system in crisis**." Ann Oncol **28**(8): 1751-1755.

The UK's Health System is in crisis, central funding no longer keeping pace with demand. Traditional responses-spending more, seeking efficiency savings or invoking market forces-are not solutions. The health of our nation demands urgent delivery of a radical new model, negotiated openly between public, policymakers and healthcare professionals. Such a model could focus on disease prevention, modifying health behaviour and implementing change in public policy in fields traditionally considered unrelated to health such as transport, food and advertising. The true cost-effectiveness of healthcare interventions must be balanced against the opportunity cost of their implementation, bolstering the central role of NICE in such decisions. Without such action, the prognosis for our healthcare system-and for the health of the individuals it serves-may be poor. Here, we explore such a new prescription for our national health.

Murphy, A. and S. Redmond (2017). "**Rapid reviews with health-technology assessments in reimbursement systems - an examination of Ireland as a case study**." Global & Regional Health Technology Assessment **4**(1): E34-E40.

Introduction: As the pace of health-technology innovations increases, greater pressure is placed on health-technology assessment (HTA) agencies to review and make recommendations promptly. One response to this pressure is the use of rapid reviews (RRs). Since 2009 all new drugs in Ireland are first subject to a RR. The RR process refers costly drugs and those with uncertainty surrounding their cost effectiveness for a full HTA. The objective of this study is to explore differences between drugs that were subject to RR only and a full HTA, compare the number of HTAs in Ireland to those in other jurisdictions and examine what factors determine the outcome of an RR, i.e. if a full HTA is recommended or not. Methods: Data on drug

evaluations from 2009 to July 2015 were extracted from the NCPE, SMC and NICE websites to support the univariate and comparative analysis. A logit regression was employed to determine the factors influencing the outcome of the RR, i.e. the recommendation for a full HTA. Also, propensity score matching was employed to determine if there was an expected difference in achieving a positive reimbursement between drugs recommended and not recommended for full HTAs. Results: Between 2009 and July 2015 a total of 199 drugs were evaluated in Ireland: 53% of them were recommended for a full HTA (n = 105) returning a 76% reimbursement rate. This compares to 120 and 355 HTAs and reimbursement rates of 68% and 80% in Scotland and England and Wales, respectively. Results of the logit reveal that first in class drugs and those indicated for cancer and musculoskeletal disorders were more likely to require a full HTA in Ireland. The matching technique revealed there was an expected difference in achieving a positive reimbursement between drugs recommended and not recommended for full HTAs. Conclusions: RRs support decision making in Ireland by reserving full scientific rigor (without comprising outcomes) for technologies that put most pressure on health budgets.

O'Mahony, J. F. and D. Coughlan (2015). "**THE IRISH COST-EFFECTIVENESS THRESHOLD: DOES IT SUPPORT RATIONAL RATIONING OR MIGHT IT LEAD TO UNINTENDED HARM OF IRELAND'S HEALTH SYSTEM?**" Value in Health **18**(7): A570-A570.

O'Mahony, J. F. and D. Coughlan (2016). "**The Irish Cost-Effectiveness Threshold: Does it Support Rational Rationing or Might it Lead to Unintended Harm to Ireland's Health System?**" Pharmacoeconomics **34**(1): 5-11.

Ireland is one of the few countries worldwide to have an explicit cost-effectiveness threshold. In 2012, an agreement between government and the pharmaceutical industry that provided substantial savings on existing medications set the threshold at euro45,000/quality-adjusted life-year (QALY). This replaced a previously unofficial threshold of euro20,000/QALY. According to the agreement, drugs within the threshold will be granted reimbursement, whereas those exceeding it may still be approved following further negotiation. A number of drugs far exceeding the threshold have been approved recently. The agreement only applies to pharmaceuticals. There are four reasons for concern regarding Ireland's threshold. The absence of an explicit threshold for non-drug interventions leaves it unclear if there is parity in willingness to pay across all interventions. As the threshold resembles a price floor rather than a ceiling, in principle it only offers a weak barrier to cost-ineffective interventions. It has no empirical basis. Finally, it is probably too high given recent estimates of a threshold for the UK based on the cost effectiveness of services forgone of approximately pound13,000/QALY. An excessive threshold risks causing the Irish health system unintended harm. The lack of an empirically informed threshold means the policy recommendations of cost-effectiveness analysis cannot be considered as fully evidence- based rational rationing. Policy makers should consider these issues and recent Irish legislation that defined cost effectiveness in terms of the opportunity cost of services forgone when choosing what threshold to apply once the current industry agreement expires at the end of 2015

Ovseiko, P. V., A. Heitmueller, P. Allen, S. M. Davies, G. Wells, G. A. Ford, A. Darzi and A. M. Buchan (2014). "**Improving accountability through alignment: the role of academic health science centres and networks in England**." BMC Health Serv Res **14**: 24.

BACKGROUND: As in many countries around the world, there are high expectations on academic health science centres and networks in England to provide high-quality care, innovative

research, and world-class education, while also supporting wealth creation and economic growth. Meeting these expectations increasingly depends on partnership working between university medical schools and teaching hospitals, as well as other healthcare providers. However, academic-clinical relationships in England are still characterised by the "unlinked partners" model, whereby universities and their partner teaching hospitals are neither fiscally nor structurally linked, creating bifurcating accountabilities to various government and public agencies. DISCUSSION: This article focuses on accountability relationships in universities and teaching hospitals, as well as other healthcare providers that form core constituent parts of academic health science centres and networks. The authors analyse accountability for the tripartite mission of patient care, research, and education, using a four-fold typology of accountability relationships, which distinguishes between hierarchical (bureaucratic) accountability, legal accountability, professional accountability, and political accountability. Examples from North West London suggest that a number of mechanisms can be used to improve accountability for the tripartite mission through alignment, but that the simple creation of academic health science centres and networks is probably not sufficient. SUMMARY: At the heart of the challenge for academic health science centres and networks is the separation of accountabilities for patient care, research, and education in different government departments. Given that a fundamental top-down system redesign is now extremely unlikely, local academic and clinical leaders face the challenge of aligning their institutions as a matter of priority in order to improve accountability for the tripartite mission from the bottom up. It remains to be seen which alignment mechanisms are most effective, and whether they are strong enough to counter the separation of accountabilities for the tripartite mission at the national level, the on-going structural fragmentation of the health system in England, and the unprecedented financial challenges that it faces. Future research should focus on determining the comparative effectiveness of different alignment mechanisms, developing standardised metrics and key performance indicators, evaluating and assessing academic health science centres and networks, and empirically addressing leadership issues.

Pitchforth, E., E. Nolte, J. Corbett, C. Miani, E. Winpenny, E. van Teijlingen, N. Elmore, S. King, S. Ball, J. Miler and T. Ling (2017). **Health Services and Delivery Research**. Community hospitals and their services in the NHS: identifying transferable learning from international developments - scoping review, systematic review, country reports and case studies. Southampton (UK), NIHR Journals Library

The notion of a community hospital in England is evolving from the traditional model of a local hospital staffed by general practitioners and nurses and serving mainly rural populations. Along with the diversification of models, there is a renewed policy interest in community hospitals and their potential to deliver integrated care. However, there is a need to better understand the role of different models of community hospitals within the wider health economy and an opportunity to learn from experiences of other countries to inform this potential. This study sought to (1) define the nature and scope of service provision models that fit under the umbrella

term 'community hospital' in the UK and other high-income countries, (2) analyse evidence of their effectiveness and efficiency, (3) explore the wider role and impact of community engagement in community hospitals, (4) understand how models in other countries operate and asses their role within the wider health-care system, and (5) identify the potential for community hospitals to perform an integrative role in the delivery of health and social care. A multimethod study including a scoping review of community hospital models, a linked systematic review of their effectiveness and efficiency, an analysis of experiences in Australia, Finland, Italy, Norway and Scotland, and case studies of four community hospitals in Finland, Italy and Scotland. The evidence reviews found that community hospitals provide a diverse range of services, spanning primary, secondary and long-term care in geographical and health system contexts. They can offer an effective and efficient alternative to acute hospitals. Patient experience was frequently reported to be better at community hospitals, and the cost-effectiveness of some models was found to be similar to that of general hospitals, although evidence was limited. Evidence from other countries showed that community hospitals provide a wide spectrum of health services that lie on a continuum between serving a 'geographic purpose' and having a specific population focus, mainly older people. Structures continue to evolve as countries embark on major reforms to integrate health and social care. Case studies highlighted that it is important to consider local and national contexts when looking at how to transfer models across settings, how to overcome barriers to integration beyond location and how the community should be best represented. The use of a restricted definition may have excluded some relevant community hospital models, and the small number of countries and case studies included for comparison may limit the transferability of findings for England. Although this research provides detailed insights into community hospitals in five countries, it was not in its scope to include the perspective of patients in any depth. At a time when emphasis is being placed on integrated and community-based care, community hospitals have the potential to assume a more strategic role in health-care delivery locally, providing care closer to people's homes. There is a need for more research into the effectiveness and cost-effectiveness of community hospitals, the role of the community and optimal staff profile(s). The National Institute for Health Research Health Services and Delivery Research programme.

Rodgers, M., J. Dalton, M. Harden, A. Street, G. Parker and A. Eastwood (2016). **Health Services and Delivery Research**. Integrated care to address the physical health needs of people with severe mental illness: a rapid review. Southampton (UK), NIHR Journals Library

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People with mental health conditions have a lower life expectancy and poorer physical health outcomes than the general population. Evidence suggests that this discrepancy is driven by a combination of clinical risk factors, socioeconomic factors and health system factors. To explore current service provision and map the recent evidence on models of integrated care addressing the physical health needs of people with severe mental illness (SMI) primarily within the mental health service setting. The research was designed as a rapid review of published evidence from

2013-15, including an update of a comprehensive 2013 review, together with further grey literature and insights from an expert advisory group. We conducted a narrative synthesis, using a guiding framework based on nine previously identified factors considered to be facilitators of good integrated care for people with mental health problems, supplemented by additional issues emerging from the evidence. Descriptive data were used to identify existing models, perceived facilitators and barriers to their implementation, and any areas for further research. The synthesis incorporated 45 publications describing 36 separate approaches to integrated care, along with further information from the advisory group. Most service models were multicomponent programmes incorporating two or more of the nine factors: (1) information sharing systems; (2) shared protocols; (3) joint funding/commissioning; (4) colocated services; (5) multidisciplinary teams; (6) liaison services; (7) navigators; (8) research; and (9) reduction of stigma. Few of the identified examples were described in detail and fewer still were evaluated, raising questions about the replicability and generalisability of much of the existing evidence. However, some common themes did emerge from the evidence. Efforts to improve the physical health care of people with SMI should empower people (staff and service users) and help remove everyday barriers to delivering and accessing integrated care. In particular, there is a need for improved communication between professionals and better information technology to support them, greater clarity about who is responsible and accountable for physical health care, and awareness of the effects of stigmatisation on the wider culture and environment in which services are delivered. The literature identified in the rapid review was limited in volume and often lacked the depth of description necessary to acquire new insights. All members of our advisory group were based in England, so this report has limited information on the NHS contexts specific to Scotland, Wales and Northern Ireland. A conventional systematic review of this topic would not appear to be appropriate in the immediate future, although a more interpretivist approach to exploring this literature might be feasible. Wherever possible, future evaluations should involve service users and be clear about which outcomes, facilitators and barriers are likely to be context-specific and which might be generalisable. The research reported here was commissioned and funded by the Health Services and Delivery Research programme as part of a series of evidence syntheses under project number 13/05/11. For more information visit www.nets.nihr.ac.uk/projects/hsdr/130511.

Scally, G. J. (2014). "**Is England's public health system still fit for purpose?**" Bmj-British Medical Journal **348**.

Snowden, A. and H. Kolb (2017). "**Two years of unintended consequences: introducing an electronic health record system in a hospice in Scotland**." J Clin Nurs **26**(9-10): 1414-1427.

Aims and objectives. To explore the impact of implementing an electronic health record system on staff at a Scottish hospice. Background. Electronic health records are broadly considered preferable to paper-based systems. However, changing from one system to the other is difficult. This study analysed the impact of this change in a Scottish hospice. Design. Naturalistic prospective repeated-measures mixed-methods approach. Methods. Data on the usability of the system, staff engagement and staff experience were obtained at four time points spanning 30 months from inception. Quantitative data were obtained from surveys, and qualitative from concurrent analysis of free-text comments and focus group. Participants were all 150 employees of a single hospice in Scotland. Results. Both system usability and staff engagement scores decreased for the first two years before recovering at 30 months. Staff experience data pointed to two main challenges: (1) Technical issues, with subthemes of accessibility and usability. (2)

Cultural issues, with subthemes of time, teamwork, care provision and perception of change. Conclusions. It took 30 months for system usability and staff engagement scores to rise, after falling significantly for the first two years. The unintended outcomes of implementation included challenges to the way the patient story was both recorded and communicated. Nevertheless, this process of change was found to be consistent with the 'J-curve' theory of organisational change, and as such, it is both predictable and manageable for other organisations. Relevance to clinical practice. It is known that implementing an electronic health record system is complex. This paper puts parameters on this complexity by defining both the nature of the complexity ('J' curve) and the time taken for the organisation to begin recovery from the challenges (two years). Understanding these parameters will help health organisations across the world plan more strategically.

Spillane, S., C. Usher and M. Barry (2016). "**The Recently Introduced System of Generic Substitution and Reference Pricing in Ireland: Generic Dispensing, Savings and Costs to the Health Service, and the Burden of Co-Payment**." Pharmacoepidemiol Drug Saf **25**: 356-357.

Stewart, E. A., S. L. Greer, I. Wilson and P. D. Donnelly (2016). "**Power to the people? An international review of the democratizing effects of direct elections to healthcare organizations**." Int J Health Plann Manage **31**(2): e69-85.

Ensuring that publicly funded health systems are democratically accountable is an enduring challenge in policy and practice. One strategy for enhancing public officials' accountability is to elect members of the public to oversee their performance. Several countries have experimented with direct elections to healthcare organizations. The most directly comparable examples involve some Canadian regional health authorities, New Zealand district health boards, foundation trusts in England and health boards in Scotland. We propose three aspects of the process by which the democratizing effects of elections should be judged: authorization, accountability and influence. Evidence from these countries suggests that the democratization of health systems is a complex task, which cannot be completed simply by introducing elections. Copyright (c) 2015 John Wiley & Sons, Ltd.

Thomas, S., C. Keegan, S. Barry, R. Layte, M. Jowett and C. Normand (2013). "**A framework for assessing health system resilience in an economic crisis: Ireland as a test case**." BMC Health Serv Res **13**: 450.

BACKGROUND: The financial crisis that hit the global economy in 2007 was unprecedented in the post war era. In general the crisis has created a difficult environment for health systems globally. The purpose of this paper is to develop a framework for assessing the resilience of health systems in terms of how they have adjusted to economic crisis. Resilience can be understood as the capacity of a system to absorb change but continue to retain essentially the same identity and function. The Irish health system is used as a case study to assess the usefulness of this framework. METHODS: The authors identify three forms of resilience: financial, adaptive and transformatory. Indicators of performance are presented to allow for testing of the framework and measurement of system performance. Both quantitative and qualitative methods were used to yield data for the Irish case study. Quantitative data were collected from government documents and sources to understand the depth of the recession and the different dimensions of the response. Semi-structured interviews were conducted with key decision makers to understand the reasons for decisions made. RESULTS: In the Irish case there is mixed evidence on resilience. Health funding was initially protected but was then followed by deep cuts as the crisis deepened. There is strong evidence for adaptive resilience,

with the health system showing efficiency gains from the recession. Nevertheless, easy efficiencies have been made and continued austerity will mean cuts in entitlements and services. The prospects for building and maintaining transformatory resilience are unsure. While the direction of reform is clear, and has been preserved to date, it is not certain whether it will remain manageable given continued austerity, some loss of sovereignty and capacity limitations. CONCLUSIONS: The three aspects of resilience proved a useful categorisation of performance measurement though there is overlap between them. Transformatory resilience may be more difficult to assess precisely. It would be useful to test out the framework against other country experiences and refine the measures and indicators. Further research on both the comparative resilience of different health systems and building resilience in preparation for crises is encouraged.

Turner, B. (2014). "**Ireland's health system at a crossroads**." Lancet **384**(9950): 1262-1263.

Turner, B. (2017). "**The new system of health accounts in Ireland: what does it all mean?**" Ir J Med Sci **186**(3): 533-540.

Background The Central Statistics Office released new figures on Ireland's health spending in December 2015, based on the System of Health Accounts (SHA2011). These figures differ from previous figures, by virtue of an expanded definition of what constitutes health care. The new figures also provide more detail on health expenditure than the previous figures allowed. Aims This article examines the new figures, drawing out findings of note and discussing the implications of these for the Irish health care system. It also compares Ireland with international health systems, highlighting where Ireland is unusual or comparable to international norms. Findings Healthcare spending in Ireland as a percentage of GDP is higher than in many other countries, having increased during the economic downturn, although this was due more to the contraction in GDP than an increase in spending. While the majority of healthcare expenditure in Ireland comes from the Government, the share of private expenditure on healthcare in Ireland has increased, with implications for equity in the system. Over half of the expenditure is on curative and rehabilitative services, broadly in line with other countries. The proportion of spending going to long-term care facilities is relatively high by international standards. Conclusion Suggestions that Ireland is over-spending on health need to be tempered by cognisance that the Irish health system is under-resourced in a number of areas (particularly the number of doctors and the number of hospital beds) and has not fully recovered from cutbacks in the late 1980s and early 1990s.

Waterson, P. (2014). "**Health information technology and sociotechnical systems: A progress report on recent developments within the UK National Health Service (NHS)**." Applied Ergonomics **45**(2): 150-161.

This paper summarises some of the research that Ken Eason and colleagues at Loughborough University have carried out in the last few years on the introduction of Health Information Technologies (HIT) within the UK National Health Service (NHS). In particular, the paper focuses on three examples which illustrate aspects of the introduction of HIT within the NHS and the role played by the UK National Programme for Information Technology (NPfIT). The studies focus on stages of planning and preparation, implementation and use, adaptation and evolution of HIT (e.g., electronic patient records, virtual wards) within primary, secondary and community care settings. Our findings point to a number of common themes which characterise the use of these systems. These include tensions between national and local strategies for implementing

HIT and poor fit between healthcare work systems and the design of HIT. The findings are discussed in the light of other large-scale, national attempts to introduce similar technologies, as well as drawing out a set of wider lessons learnt from the NPfIT programme based on Ken Eason's earlier work and other research on the implementation of large-scale HIT. (C) 2013 Elsevier Ltd and The Ergonomics Society. All rights reserved.

Young, A. (2017). "**Innovation within a national health care system**." Surgery **161**(5): 1179-1182.
Tony is a practicing frontline National Health Service surgeon and director of medical innovation at Anglia Ruskin University and has founded 4 medical-technology start-ups. He has also cofounded the pound500 million Anglia Ruskin MedTech Campus, which will become one of the world's largest health innovation spaces. In 2014, he was appointed as national clinical director for innovation at National Health Service England and in February 2016 became the first national clinical lead for innovation. In this role, he provides clinical leadership and support in delivering improved health outcomes in England, drives the uptake of proven innovations across the National Health Service, promotes economic growth through innovation, and helps make the National Health Service the go-to place on the planet for medical innovation.

Session 3 Epidemiology, burden of disease and surveillance of HPV and HPV related cancers in Ireland and the UK

HPV asscociated cancers in Ireland
Mairead O'Connor
References provided by the speaker:
Walsh P, O'Connor M, Clough-Gorr K. **HPV-associated cancers**. Cancer Trends No.33 https://www.ncri.ie/publications/cancer-trends-and-projections/cancer-trends-33-hpv-associated-cancers.

Schache AG, Powell NG, Cuschieri KS et al. **HPV-related oropharynx cancer in the United Kingdom: An evolution in the understanding of disease etiology**. Cancer Research Cancer Res. 2016; 76: 6598-6606. doi: 10.1158/0008-5472.CAN-16-0633. ECHO (Epidemiology of HPV infection in Oral cancer in Ireland). http://cerviva.ie/projects/phase-iii-cerviva-carg/echoepidemiology-hpv-infection-oral-cancer-ireland.

Viens LJ, Henley J, Watson et al. **Human papilloma-virus associated cancers – United States, 2008-2012**. MMWR Mor Mortal Wkly Rep. 2016; 65: 661-666.

Bruni L, Barrionuevo-Rosas L, Albero G, Serrano B, Mena M, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO Information Centre on HPV and Cancer (HPV Information Centre). **Human Papillomavirus and Related Diseases in the World**. Summary Report.

Surveillance of HPV; a focus on the UK
Kate Cushieri
References provided by the speaker:
Kavanagh K, Pollock KG, Cuschieri K, Palmer T, Cameron RL, Watt C, Bhatia R, Moore C, Cubie H, Cruickshank M, Robertson C. **Changes in the prevalence of human papillomavirus following a national bivalent human papillomavirus vaccination programme in Scotland: a 7-year cross-sectional study**. Lancet Infect Dis. 2017 Sep 28. pii: S1473-3099(17)30468-1. doi: 10.1016/S1473-3099(17)30468-1. [Epub ahead of print] PubMed PMID: 28965955.

Mesher D, Cuschieri K, Hibbitts S, Jamison J, Sargent A, Pollock KG, Powell N, Wilson R, McCall F, Fiander A, Soldan K. **Type-specific HPV prevalence in invasive cervical cancer in the UK prior to national HPV immunisation programme: baseline for monitoring the effects of immunisation**. J Clin Pathol. 2015 Feb;68(2):135-40. doi: 10.1136/jclinpath-2014-202681. Epub 2014 Nov 19. PubMed PMID: 25410654.

Cameron RL, Kavanagh K, Cameron Watt D, Robertson C, Cuschieri K, Ahmed S, Pollock KG. **The impact of bivalent HPV vaccine on cervical intraepithelial neoplasia by deprivation in Scotland: reducing the gap. J Epidemiol Community Health**. 2017 Oct;71(10):954-960. doi: 10.1136/jech-2017-209113. Epub 2017 Jul 29. PubMed PMID: 28756395.

Cruickshank ME, Pan J, Cotton SC, Kavanagh K, Robertson C, Cuschieri K, Cubie H, Palmer T, Pollock KG. **Reduction in colposcopy workload and associated clinical activity following human papillomavirus (HPV) catch-up vaccination programme in Scotland: an ecological study**. BJOG. 2017 Aug;124(9):1386-1393. doi: 10.1111/1471-0528.14562. Epub 2017 Mar 9. PubMed PMID: 28102928.

Tanton C, Mesher D, Beddows S, Soldan K, Clifton S, Panwar K, Field N, Mercer CH, Johnson AM, Sonnenberg P. **Human papillomavirus (HPV) in young women in Britain: Population-based evidence of the effectiveness of the bivalent immunisation programme and burden of quadrivalent and 9-valent vaccine types**. Papillomavirus Res. 2017 Jun;3:36-41. doi: 10.1016/j.pvr.2017.01.001. PubMed PMID: 28626810; PubMed Central PMCID: PMC5462921.

Northern Ireland

Lesley Anderson

References provided by the speaker:

Anderson LA, O'Rorke MA, Wilson R, Jamison J, Gavin AT; Northern Ireland HPV Working Group. **HPV prevalence and type-distribution in cervical cancer and premalignant lesions of the cervix: A population-based study from Northern Ireland**. zJ Med Virol. 2016 Jul;88(7):1262-70. doi: 10.1002/jmv.24447. Epub 2016 Jan 5.

Anderson L, O'Rorke M, Jamison J, Wilson R, Gavin A; HPV Working Group members. **Prevalence of human papillomavirus in women attending cervical screening in the UK and Ireland: new data from northern Ireland and a systematic review and meta-analysis**. J Med Virol. 2013 Feb;85(2):295-308. doi: 10.1002/jmv.23459. Epub 2012 Nov 14. Review.

References session 3 via PubMed search:

A PubMed search was performed with the following selection criteria:

1. Ireland AND HPV AND epidemiology; Ireland AND HPV AND burden of disease; Ireland AND HPV AND surveillance in the last 5 years: 3 items retrieved.
2. England AND HPV AND epidemiology; England AND HPV AND burden of disease; England AND HPV AND surveillance in the last 5 years: 10 items retrieved
3. Northern Ireland AND HPV AND epidemiology; Northern Ireland AND HPV AND burden of disease; Northern Ireland AND HPV AND surveillance in the last 5 years: **0**
4. Wales AND HPV AND epidemiology; Wales AND HPV AND burden of disease; Wales AND HPV AND surveillance in the last 5 years: **2** items retrieved.
5. UK AND HPV AND epidemiology; UK AND HPV AND burden of disease; UK AND HPV AND surveillance in the last 5 years: 23.

The list contains a manual selection of **13** publications relevant to session 3.

Beral, V. (2015). "**Reprint of "Cancer of the cervix: A sexually transmitted infection?"**." Cancer Epidemiol **39**(6): 1148-1151.

When mortality patterns for cancer of the uterine cervix were compared with trends in incidence of sexually transmitted diseases in both England and Wales and in Scotland, there were striking associations between the temporal, social class, occupational, and geographic distributions of these diseases. The data suggest that exposure to sexually transmitted infection is an important determinant of cervical cancer. Although they are still young, women born after 1940 are already experiencing increased cervical-cancer mortality. If cervical-cancer prevention and therapy remain unchanged, this generation's high risk of death from cervical cancer will probably continue to operate throughout their lives.

Hibbitts, S., A. Tristram, H. Beer, J. McRea, B. Rose, A. Hauke, D. Nuttall, N. Dallimore, R. G. Newcombe and A. Fiander (2014). "**UK population based study to predict impact of HPV vaccination**." J Clin Virol **59**(2): 109-114.

BACKGROUND: In 2008 a human papillomavirus (HPV) vaccination programme for cervical cancer prevention was implemented in the UK. Surveillance of vaccine uptake, impact on prevalence of HPV infection and cervical cancer incidence were identified as key measures to evaluate the intervention. OBJECTIVE: To determine baseline HPV prevalence in unvaccinated women and predict impact of HPV vaccination on high-grade cervical disease (CIN2+). STUDY DESIGN: A pseudo-anonymous prospective cohort was sampled on entry to the routine cervical screening programme between March 2009 and November 2010. In total, 13,306 eligible females were identified and high-risk (hrHPV) type specific status determined. Potential impact of prophylactic vaccination on CIN2+ was calculated by applying HPV vaccine clinical trial data to the baseline HPV type-specific data. RESULTS: Of 13,306 samples tested, 3545 (26.6%) were confirmed positive for at least one hrHPV type and 1325 (10%) were positive for low risk HPV. HPV16 was the predominant type detected in cases positive with either single or multiple hrHPV infection(s) (5.2% and 4.7%, respectively). Based on hrHPV type-specific data, Gardasil would have prevented 33.2% HPV16/18 unrelated CIN2+ compared to 47.1% for Cervarix. This difference was not statistically significant. CONCLUSION: Prior to the introduction of the HPV vaccine, approximately one-quarter of young women were positive for hrHPV and one-tenth positive for HPV16. Post-vaccination, we anticipate a substantial absolute risk reduction in high-grade cervical disease associated with both targeted and non-targeted hrHPV types. There is no significant difference between the two commercially available vaccines in terms of clinical impact.

Holl, K., A. M. Nowakowski, N. Powell, W. G. McCluggage, E. C. Pirog, S. Collas De Souza, W. A. Tjalma, M. Rosenlund, A. Fiander, M. Castro Sanchez, V. Damaskou, E. A. Joura, B. Kirschner, R. Koiss, J. O'Leary, W. Quint, O. Reich, A. Torne, M. Wells, L. Rob, L. Kolomiets, A. Molijn, A. Savicheva, E. Shipitsyna, D. Rosillon and D. Jenkins (2015). "**Human papillomavirus prevalence and type-distribution in cervical glandular neoplasias: Results from a European multinational epidemiological study**." Int J Cancer **137**(12): 2858-2868.

Cervical glandular neoplasias (CGN) present a challenge for cervical cancer prevention due to their complex histopathology and difficulties in detecting preinvasive stages with current screening practices. Reports of human papillomavirus (HPV) prevalence and type-distribution in CGN vary, providing uncertain evidence to support prophylactic vaccination and HPV screening. This study [108288/108290] assessed HPV prevalence and type-distribution in women diagnosed with cervical adenocarcinoma in situ (AIS, N = 49), adenosquamous carcinoma (ASC,

N = 104), and various adenocarcinoma subtypes (ADC, N = 461) from 17 European countries, using centralised pathology review and sensitive HPV testing. The highest HPV-positivity rates were observed in AIS (93.9%), ASC (85.6%), and usual-type ADC (90.4%), with much lower rates in rarer ADC subtypes (clear-cell: 27.6%; serous: 30.4%; endometrioid: 12.9%; gastric-type: 0%). The most common HPV types were restricted to HPV16/18/45, accounting for 98.3% of all HPV-positive ADC. There were variations in HPV prevalence and ADC type-distribution by country. Age at diagnosis differed by ADC subtype, with usual-type diagnosed in younger women (median: 43 years) compared to rarer subtypes (medians between 57 and 66 years). Moreover, HPV-positive ADC cases were younger than HPV-negative ADC. The six years difference in median age for women with AIS compared to those with usual-type ADC suggests that cytological screening for AIS may be suboptimal. Since the great majority of CGN are HPV16/18/45-positive, the incorporation of prophylactic vaccination and HPV testing in cervical cancer screening are important prevention strategies. Our results suggest that special attention should be given to certain rarer ADC subtypes as most appear to be unrelated to HPV.

Howell-Jones, R., N. de Silva, M. Akpan, P. Oakeshott, C. Carder, L. Coupland, M. Sillis, H. Mallinson, V. Ellis, D. Frodsham, T. I. Robinson, O. N. Gill, S. Beddows and K. Soldan (2012). "**Prevalence of human papillomavirus (HPV) infections in sexually active adolescents and young women in England, prior to widespread HPV immunisation**." Vaccine **30**(26): 3867-3875.

INTRODUCTION: The introduction of an HPV immunisation programme in England should result in a significant reduction in the prevalence of vaccine type infections in young women. Here we describe type-specific HPV prevalence in three samples of the young female population in England, prior to the beginning of mass immunisation in 2008. METHODS: Residual vulva-vaginal swab samples from females aged under 25 years undergoing chlamydia testing as part of the National Chlamydia Screening Programme (NCSP) or Prevention of Pelvic Infection (POPI) trial were collected from sites across England, together with available demographic and sexual behaviour data. Residual samples were screened for HPV infection using the Hybrid Capture 2 (hc2) HPV DNA Test, including the high-risk (HR) and low-risk (LR) probes. Hc2 positive samples were genotyped using the Roche Linear Array (LA) HPV Genotyping Test. RESULTS: A total of 3829 samples were included: 2369 from 16 to 24 year old NCSP participants, 275 from 13 to 15 year old NCSP participants and 1185 from 16 to 24 year old POPI participants. Variations in HPV prevalence between and within the different samples followed a pattern largely consistent with differences in sexual behaviour. The prevalence of total HR HPV infection, of HPV 16 and/or 18 (16/18) infection and of five HR HPV types closely related to HPV 16/18 (HPV 31, 33, 45, 52 or 58) amongst 16-24 year old NCSP participants was 35% (95% CI 33-37%), 18% (95% CI 16-19%), and 16% (95% CI 14-18%), respectively. Risk of HR HPV infection increased with age during the teen years and was higher in women who reported two or more sexual partners in the last year and in women with chlamydia infection. Approximately half of women with HPV 16/18 infection also had another non-vaccine HR HPV type present. CONCLUSIONS: Prior to HPV immunisation, there was a high prevalence of HPV infections in the lower genital tract of young, sexually active females in England. The overall, type-specific, and multiple infection prevalence closely reflected age and sexual activity. These data provide a baseline against which the early impact of HPV immunisation on the prevalence of HPV 16/18 and closely related types in young women can be measured, in order to inform immunisation and cervical screening policies.

Karlsberg Schaffer, S., J. Sussex, D. Hughes and N. Devlin (2016). "**Opportunity costs and local health service spending decisions: a qualitative study from Wales**." BMC Health Serv Res **16**: 103.

BACKGROUND: All health care systems face the need to find the resources to meet new demands such as a new, cost-increasing health technology. In England and Wales, when a health technology is recommended by the National Institute for Health and Care Excellence (NICE), the National Health Service (NHS) is mandated to provide the funding to accommodate it within three months of publication of the recommendation. Identifying what, in practice, is foregone when new cost-increasing technologies are introduced is important for understanding the effects of health technology assessment (HTA) decisions on the NHS or any other health care system. Our objective was to investigate how in practice local NHS commissioners in Wales accommodated financial "shocks" arising from technology appraisals (TAs) issued by NICE and from other cost pressures. METHODS: Semi-structured interviews were conducted with Finance Directors and Medical Directors from all seven Local Health Boards (LHBs) in NHS Wales. These interviews covered prioritisation processes, as well as methods of financing NICE TAs and other financial shocks at each LHB. We then undertook a systematic identification of themes and topics from the information recorded. The study relates to the period October 2010 to March 2013. RESULTS: The financial impact of NICE TAs is generally anticipated and planned for in advance and the majority of LHBs have contingency funds available to cope with these and other financial shocks within-period. Efficiency savings (defined as reductions in costs with no assumed reductions in quality) were a source of funds for cost pressures of all kinds. Service displacements were not linkable to particular NICE TAs and there appears to be a general lack of explicit prioritisation activities. The Welsh Government has, on occasion, explicitly or implicitly acted as the funder of last resort. CONCLUSIONS: Services may be displaced as part of a response to the cumulative impact of all types of cost pressures, including cost-increasing health technologies recommended by NICE, but such displacements were not direct responses to the publication of individual NICE TAs. The additional cost pressure represented by a new NICE TA is likely to be accommodated at least partly by greater efficiency and increased expenditure rather than displacement of services.

Kavanagh, K., K. Sinka, K. Cuschieri, J. Love, A. Potts, K. G. Pollock, H. Cubie, M. Donaghy and C. Robertson (2013). "**Estimation of HPV prevalence in young women in Scotland; monitoring of future vaccine impact**." BMC Infect Dis **13**: 519.

BACKGROUND: Estimation of pre-immunisation prevalence of HPV and distribution of HPV types is fundamental to understanding the subsequent impact of HPV vaccination. We describe the type specific prevalence of HPV in females aged 20-21 in Scotland who attended or defaulted from cervical screening using three specimen types; from attenders liquid based cytology and from defaulters urine or self-taken swabs. METHODS: Residual liquid based cytology samples (n = 2148), collected from women aged 20-21 attending for their first smear were genotyped for HPV. A sample (n = 709) from women who had defaulted from screening was also made available for HPV testing through the use of postal testing kits (either urine samples (n = 378) or self-taken swabs (n = 331)). Estimates of prevalence weighted by deprivation, and for the postal testing kit, also by reminder status and specimen type were calculated for each HPV type. The distribution of HPV types were compared between specimen types and the occurrence of multiple high-risk infections examined. The influence of demographic factors on high-risk HPV positivity and multiple infections was examined via logistic regression. RESULTS: The prevalence of any HPV in young women aged 20-21 was 32.2% for urine, 39.5% for self-taken swab, and 49.4% for LBC specimens. Infection with vaccine specific types (HPV 16, 18) or those associated

with cross-protection (HPV 31, 33, 45, 51) was common. Individuals were more likely to test positive for high-risk HPV if they resided in an area of high deprivation or in a rural area. The overall distribution of HPV types did not vary between defaulters and attenders. Multiple infections occurred in 48.1% of high-risk HPV positive individuals. Excluding vaccine types the most common pairing was HPV 56 and 66. CONCLUSIONS: Understanding of the pre-immunisation prevalence of HPV in young women puts Scotland in a prime position to assess the early effect of vaccination as the first highly vaccinated cohorts of individuals enter the screening programme. Differences in results with different specimen types must be taken into account when monitoring the impact of vaccination programmes.

Oakeshott, P., A. Aghaizu, F. Reid, R. Howell-Jones, P. E. Hay, S. T. Sadiq, C. J. Lacey, S. Beddows and K. Soldan (2012). "**Frequency and risk factors for prevalent, incident, and persistent genital carcinogenic human papillomavirus infection in sexually active women: community based cohort study**." Bmj **344**: e4168.

OBJECTIVE: To investigate frequency and risk factors for prevalent, incident, and persistent carcinogenic human papillomavirus (HPV) in young women before the introduction of immunisation against HPV types 16 and 18 for schoolgirls. DESIGN: Cohort study SETTING: 20 London universities and further education colleges. PARTICIPANTS: 2185 sexually active female students, mean age 21 years (range 16-27), 38% from ethnic minorities, who took part in the POPI (prevention of pelvic infection) chlamydia screening trial in 2004-08 and who provided duplicate, self taken vaginal swabs and completed questionnaires at baseline. At follow-up, a median of 16 months later, 821 women (38%) returned repeat vaginal swabs by post. In 2009-10, stored samples were tested for HPV. RESULTS: Samples from 404/2185 (18.5% (95% CI 16.9% to 20.2%)) of the cohort were positive for carcinogenic HPV at baseline, including 15.0% (327) positive for non-vaccine carcinogenic genotypes. Reporting two or more sexual partners in the previous year and concurrent Chlamydia trachomatis or bacterial vaginosis were independent risk factors for prevalent vaginal HPV infection. Infection with one or more new HPV types was found in 17.7% (145/821) of follow-up samples, giving an estimated annual incidence of carcinogenic HPV infection of 12.9% (95% CI 11.0% to 15.0%). Incident infection was more common in women reporting two or more partners in the previous year, aged<20, of black ethnicity, or with C trachomatis vaginosis at baseline. Multiple partners was the only independent risk factor for incident infection (adjusted relative risk 1.99 (95% CI 1.46 to 2.72)). Of 143 women with baseline carcinogenic HPV infection, 20 (14% (8.3% to 19.7%) had infection with the same carcinogenic HPV type(s) detected after 12-28 months. Of these women, 13 (65%) had redetected infection with HPV 16 or 18, and nine (45%) with non-vaccine carcinogenic HPV genotypes. CONCLUSION: In the first UK cohort study of carcinogenic HPV in young women in the community, multiple sexual partners was an independent predictor of both prevalent and incident infection. Infection with non-vaccine carcinogenic genotypes was common. Although current HPV vaccines offer partial cross protection against some non-vaccine carcinogenic HPV types, immunised women will still need cervical screening.

Powell, N., K. Cuschieri, H. Cubie, S. Hibbitts, D. Rosillon, S. C. De Souza, A. Molijn, W. Quint, K. Holl and A. Fiander (2013). "**Cervical cancers associated with human papillomavirus types 16, 18 and 45 are diagnosed in younger women than cancers associated with other types: a cross-sectional observational study in Wales and Scotland (UK)**." J Clin Virol **58**(3): 571-574.

BACKGROUND: Most cervical cancers are attributable to infection with one of fourteen types of human papillomavirus (HPV), but HPV types differ in oncogenic potential. Characterisation of

cancers associated with specific HPV types is required to predict the likely impact of current prophylactic vaccines and the potential benefits of vaccine formulations including additional HPV types. OBJECTIVE: The study aimed to correlate HPV type with histology and age at diagnosis, in Invasive Cervical Cancers (ICCs) from two of the devolved countries of the UK (Wales and Scotland). STUDY DESIGN: Centralised histopathology review and rigorously standardised HPV-DNA typing were applied to 592 ICC diagnosed 2001-2006. HPV status was analysed in relation to histology and age at diagnosis. RESULTS: HPV infection was confirmed in 535/592 cases. Among the 497 tumours infected with single HPV types, the three most common types were HPV16 (62% 95%CI: 57.6-66.1), HPV18 (18.9% 95%CI: 15.7-22.6) and HPV45 (5.4% 95%CI: 3.7-7.8). HPV16 or 18 were present in 80.9% of HPV positive cases. Women with tumours associated with HPV types 16, 18 and 45 were on average 10.5 years younger at diagnosis than women with tumours associated with other HPV types. CONCLUSIONS: Prophylactic vaccines targeting HPV16 and 18 could potentially prevent up to 80.9% of ICC in the populations investigated. Cancers associated with HPV16, 18 and 45 were diagnosed at younger ages, supporting the hypothesis of faster progression than for tumours caused by other HPV types.

Sadlier, C., D. Rowley, D. Morley, S. Surah, S. O'Dea, S. Delamere, J. O'Leary, P. Smyth, S. Clarke, O. Sheils and C. Bergin (2014). "**Prevalence of human papillomavirus in men who have sex with men in the era of an effective vaccine; a call to act**." HIV Med **15**(8): 499-504.

OBJECTIVES: The incidence of human papillomavirus (HPV)-associated anal cancer is increasing. Men who have sex with men (MSM), particularly those coinfected with HIV, are disproportionately affected. Documenting the molecular epidemiology of HPV infection is important in guiding policy makers in formulating universal and/or targeted vaccine guidelines. METHODS: A prospective cohort study was conducted. HIV-positive and HIV-negative MSM > 18 years old were invited to participate. Provider-performed anal swabs were collected and anal HPV infection was detected using consensus primer solution phase polymerase chain reaction (PCR) followed by type-specific PCR for high-risk (HR)-HPV types 16, 18 and 31. Between-group differences were analysed using chi(2) tests and Wilcoxon rank tests. RESULTS: One hundred and ninety-four MSM [mean (standard deviation (SD)) age 36 (10) years; 51% HIV-positive) were recruited. The median number of sexual contacts in the preceding 12 months was 4 (interquartile range 2-10). HIV-positive subjects had a mean (SD) CD4 count of 557 (217) cells/muL, and 84% were on highly active antiretroviral therapy (HAART). Thirty-one samples were B-globin negative and thus excluded from further analysis. A total of 113 subjects (69%) had detectable HPV DNA. Sixty-eight subjects (42%) had an HR-HPV type detected. HR HPV type 16 was detected in 44 samples (27%), HR-HPV type 18 in 26 samples (16%) and HR-HPV type 31 in 14 samples (23%). Twenty-eight subjects (17%) had more than one type of HR-HPV type detected. When HPV and HR-HPV were stratified by age, those > 35 years had a higher prevalence (P = 0.001 and P = 0.028, respectively). HIV-positive subjects were more likely than HIV-negative subjects to have any detectable HPV (77% vs. 61%, respectively; P = 0.04), to have HR-HPV type 18 or 31 (P = 0.05 and P = 0.006, respectively) and to be infected with more than one HR-HPV type (31% vs. 3%, respectively; P < 0.001). Within the HIV-positive group, the prevalence of HPV was higher in those not on HAART (P = 0.041), although it did not differ when stratified by CD4 count. CONCLUSIONS: The identified prevalence of anal HPV infection was high. Emerging patterns of HPV-related disease strengthen the call for universal vaccination of boys and girls with consideration of catch-up and targeted vaccination of high-risk groups such as MSM and those with HIV infection.

Saunders, C. L., C. Meads, G. A. Abel and G. Lyratzopoulos (2017). "**Associations Between Sexual Orientation and Overall and Site-Specific Diagnosis of Cancer: Evidence From Two National Patient Surveys in England**." J Clin Oncol: Jco2017725465.

Purpose To address gaps in evidence on the risk of cancer in people from sexual minorities. Patients and Methods We used data from 796,594 population-based English General Practice Patient Survey responders to explore the prevalence of self-reported diagnoses of cancer in the last 5 years among sexual minorities compared with heterosexual women and men. We analyzed data from 249,010 hospital-based English Cancer Patient Experience Survey responders with sexual orientation as a binary outcome, and International Classification of Diseases, Tenth, Revision, diagnosis as covariate-38 different common and rarer cancers, with breast and prostate cancer as baseline categories for women and men, respectively-to examine whether people from sexual minorities are over- or under-represented among different cancer sites. For both analyses, we used logistic regression, stratified by sex and adjusted for age. Results A diagnosis of cancer in the past 5 years was more commonly reported by male General Practice Patient Survey responders who endorsed gay or bisexual orientation compared with heterosexual men (odds ratio [OR], 1.31; 95% CI, 1.15 to 1.49; P < .001) without evidence of a difference between lesbian or bisexual compared with heterosexual women (OR, 1.14; 95% CI, 0.94 to 1.37; P = .19). For most common and rarer cancer sites (30 of 33 in women, 28 of 32 in men), the odds of specific cancer site diagnosis among Cancer Patient Experience Survey respondents seemed to be independent of sexual orientation; however, there were notable differences in infection-related (HIV and human papillomavirus [HPV]) cancers. Gay or bisexual men were over-represented among men with Kaposi's sarcoma (OR, 48.2; 95% CI, 22.0 to 105.6), anal (OR, 15.5; 95% CI, 11.0 to 21.9), and penile cancer (OR, 1.8; 95% CI, 0.9 to 3.7). Lesbian or bisexual women were over-represented among women with oropharyngeal cancer (OR, 3.2; 95% CI, 1.7 to 6.0). Conclusion Large-scale evidence indicates that the distribution of cancer sites does not vary substantially by sexual orientation, with the exception of some HPV- and HIV-associated cancers. These findings highlight the importance of HPV vaccination in heterosexual and sexual minority populations.

Sonnenberg, P., S. Clifton, S. Beddows, N. Field, K. Soldan, C. Tanton, C. H. Mercer, F. C. da Silva, S. Alexander, A. J. Copas, A. Phelps, B. Erens, P. Prah, W. Macdowall, K. Wellings, C. A. Ison and A. M. Johnson (2013). "**Prevalence, risk factors, and uptake of interventions for sexually transmitted infections in Britain: findings from the National Surveys of Sexual Attitudes and Lifestyles (Natsal)**." Lancet **382**(9907): 1795-1806.

BACKGROUND: Population-based estimates of prevalence, risk distribution, and intervention uptake inform delivery of control programmes for sexually transmitted infections (STIs). We undertook the third National Survey of Sexual Attitudes and Lifestyles (Natsal-3) after implementation of national sexual health strategies, and describe the epidemiology of four STIs in Britain (England, Scotland, and Wales) and the uptake of interventions. METHODS: Between Sept 6, 2010 and Aug 31, 2012, we did a probability sample survey of 15,162 women and men aged 16-74 years in Britain. Participants were interviewed with computer-assisted face-to-face and self-completion questionnaires. Urine from a sample of participants aged 16-44 years who reported at least one sexual partner over the lifetime was tested for the presence of Chlamydia trachomatis, type-specific human papillomavirus (HPV), Neisseria gonorrhoeae, and HIV antibody. We describe age-specific and sex-specific prevalences of infection and intervention uptake, in relation to demographic and behavioural factors, and explore changes since Natsal-1 (1990-91) and Natsal-2 (1999-2001). FINDINGS: Of 8047 eligible participants invited to provide a

urine sample, 4828 (60%) agreed. We excluded 278 samples, leaving 4550 (94%) participants with STI test results. Chlamydia prevalence was 1.5% (95% CI 1.1-2.0) in women and 1.1% (0.7-1.6) in men. Prevalences in individuals aged 16-24 years were 3.1% (2.2-4.3) in women and 2.3% (1.5-3.4) in men. Area-level deprivation and higher numbers of partners, especially without use of condoms, were risk factors. However, 60.4% (45.5-73.7) of chlamydia in women and 43.3% (25.9-62.5) in men was in individuals who had had one partner in the past year. Among sexually active 16-24-year-olds, 54.2% (51.4-56.9) of women and 34.6% (31.8-37.4) of men reported testing for chlamydia in the past year, with testing higher in those with more partners. High-risk HPV was detected in 15.9% (14.4-17.5) of women, similar to in Natsal-2. Coverage of HPV catch-up vaccination was 61.5% (58.2-64.7). Prevalence of HPV types 16 and 18 in women aged 18-20 years was lower in Natsal-3 than Natsal-2 (5.8% [3.9-8.6] vs 11.3% [6.8-18.2]; age-adjusted odds ratio 0.44 [0.21-0.94]). Gonorrhoea (<0.1% prevalence in women and men) and HIV (0.1% prevalence in women and 0.2% in men) were uncommon and restricted to participants with recognised high-risk factors. Since Natsal-2, substantial increases were noted in attendance at sexual health clinics (from 6.7% to 21.4% in women and from 7.7% to 19.6% in men) and HIV testing (from 8.7% to 27.6% in women and from 9.2% to 16.9% in men) in the past 5 years. INTERPRETATION: STIs were distributed heterogeneously, requiring general and infection-specific interventions. Increases in testing and attendance at sexual health clinics, especially in people at highest risk, are encouraging. However, STIs persist both in individuals accessing and those not accessing services. Our findings provide empirical evidence to inform future sexual health interventions and services. FUNDING: Grants from the UK Medical Research Council and the Wellcome Trust, with support from the Economic and Social Research Council and the Department of Health.

Van Effelterre, T., C. Hogea and S. Taylor (2014). "**Projected impact of Cervarix(R) vaccination on oncogenic human papillomavirus infection and cervical cancer in the United Kingdom**." Hum Vaccin Immunother **10**(7): 1794.

We developed a dynamic compartmental model to assess the impact of HPV Universal Mass Vaccination with Cervarix((R)), which offers protection against HPV16/18 and cross-protection against other cancer-causing types, using up-to-date efficacy data. Analyses were performed in the UK because of the large amount of high quality epidemiological data available. For each HPV type/group of types considered, the model was calibrated to 14 epidemiological data sets (prevalence of HPV infection, cervical intraepithelial neoplasia (CIN): CIN1, CIN2, CIN3 pre-screening and cervical cancer (CC) incidence over 10 years post-screening). Impacts of cross-protection, female catch-up vaccination, and additional male vaccination on oncogenic infections, high-grade CIN (CIN2+) and CC were evaluated. Our results show that female UMV with 80% coverage and cross-protection against high-risk types resulted in 79% CIN2+ and 84% CC reductions vs. 55% and 71%, respectively, without cross-protection. Vaccinating 40% of males and 80% of females was equivalent to 90% female-only coverage regarding CIN2+ (85% and 86%, respectively) and CC (90% and 91%, respectively) reductions. Female-only coverage of 80% substantially reduced male HPV16 and 18 infection due to herd protection (59% and 80%, respectively). Increasing female coverage to 90% reduced HPV16 and HPV18 infections in males similarly to 80% female combined with 20% and 40% male coverage, respectively. Model outcomes strengthen previous conclusions about the significant added value of Cervarix((R)) cross-protection for CC prevention, the primary HPV vaccination public health priority. Regarding female CC prevention and male HPV16/18 infection, small increases in female coverage induce similar benefits achieved by additionally vaccinating men with 20-40%

coverage.

Wakeham, K. and K. Kavanagh (2014). "**The burden of HPV-associated anogenital cancers**." Curr Oncol Rep **16**(9): 402.

The epidemiology of anogenital cancers is under going substantial change. Cervical cancer remains a major public health concern, particular in resource-limited settings. Cancers of the anus, penis, vagina and vulva are relatively uncommon cancers, but may be increasing in incidence. The change in occurrence of anogenital cancers may be due to increasing HPV transmission secondary to changes in sexual behaviour. Screening programmes and the HPV vaccine offer optimism that anogenital cancers can be prevented. This article reviews the epidemiology of anogenital cancers with a focus on Scottish data.

Session 4 Prevention and control of HPV in the Ireland and the UK

HPV vaccination programme in the UK
Vanessa Saliba
References provided by the speaker:
PHE HPV programme resources: https://www.gov.uk/government/collections/immunisation#human-papillomavirus-(hpv)

PHE HPV Programme review 2008-2014: https://www.gov.uk/government/publications/human-papillomavirus-hpv-immunisation-programme-review-2008-to-2014

PHE HPV Programme vaccine uptake statistics: https://www.gov.uk/government/collections/vaccine-uptake#hpv-vaccine-uptake

References session 4 via PubMed search:

A PubMed search was performed with the following selection criteria:

1. Ireland AND HPV AND vaccination program in the last 5 years: 0
2. England AND HPV AND vaccination program in the last 5 years: 3.
3. Northern Ireland AND HPV AND vaccination program in the last 5 years: **0**
4. Wales AND HPV AND vaccination program in the last 5 years: 7.
5. UK AND HPV AND vaccination program in the last 5 years: 6.
6. Ireland AND "cervical cancer" AND prevention AND control AND treatment in the last 5 years: 6.
7. England AND "cervical cancer" AND prevention AND control AND treatment in the last 5 years: 30 items retrieved.
8. Northern Ireland AND AND "cervical cancer" AND prevention AND control AND treatment in the last 5 years: 3.
9. Wales AND "cervical cancer" AND prevention AND control AND treatment in the last 5 years: 8.
10. UK AND "cervical cancer" AND prevention AND control AND treatment in the last 5 years: 72.

The list contains a manual selection of **112** publications relevant to session 4.

Anderson, L. A., M. A. O'Rorke, R. Wilson, J. Jamison and A. T. Gavin (2016). "**HPV prevalence and type-distribution in cervical cancer and premalignant lesions of the cervix: A population-based study from Northern Ireland**." J Med Virol **88**(7): 1262-1270.

Assessment of Human papillomavirus (HPV) prevalence and genotype distribution is important for monitoring the impact of prophylactic HPV vaccination. This study aimed to demonstrate the HPV genotypes predominating in pre-malignant and cervical cancers in Northern Ireland (NI) before the vaccination campaign has effect. Formalin fixed paraffin embedded tissue blocks from 2,303 women aged 16-93 years throughout NI were collated between April 2011 and February 2013. HPV DNA was amplified by PCR and HPV genotyping undertaken using the Roche((R)) linear array detection kit. In total, 1,241 out of 1,830 eligible samples (68.0%) tested positive for HPV, with the majority of these [1,181/1,830 (64.5%)] having high-risk (HR) HPV infection; 37.4% were positive for HPV-16 (n = 684) and 5.1% for HPV-18 (n = 93). HPV type-specific prevalence was 48.1%, 65.9%, 81.3%, 92.2%, and 64.3% among cervical intraepithelial neoplasias (CIN) Grades I-III, squamous cell carcinomas (SCC) and adenocarcinoma (AC) cases, respectively. Most SCC cases (81.3%) had only one HPV genotype detected and almost a third (32.0%) of all cervical pathologies were HPV negative including 51.9% of CIN I (n = 283), 34.1% CIN II (n = 145), 18.7% of CIN III (n = 146), 7.8% of SCC (n = 5), and 35.7% of AC (n = 5) cases. This study provides important baseline data for monitoring the effect of HPV vaccination in NI and for comparison with other UK regions. The coverage of other HR-HPV genotypes apart from 16 and 18, including HPV-45, 31, 39, and 52, and the potential for cross protection, should be considered when considering future polyvalent vaccines.

Andrews, N., J. Stowe and E. Miller (2017). "**No increased risk of Guillain-Barre syndrome after human papilloma virus vaccine: A self-controlled case-series study in England**." Vaccine **35**(13): 1729-1732.

OBJECTIVE: To investigate the risk of Guillain-Barre syndrome (GBS) after human papilloma virus (HPV) vaccine given to 12-18year old girls in England. METHODS: Hospital Episode Statistics (HES) were searched using data to March 2016 to identify incident cases of GBS in female patients aged from 11 to 20years eligible to have received the HPV vaccine since its introduction as a 3 dose schedule in September 2008. Diagnosis was confirmed by the case's general practitioner (GP) who also provided HPV vaccination dates. The risk of admission within 3months (primary risk window) 6 and 12months of any dose was assessed using the self-controlled case-series (SCCS) method in vaccinated girls with age, season and time-period adjustment. The risk before and after the change in 2012 from bivalent vaccine to quadrivalent vaccine was also assessed. RESULTS: A total 244 episodes were initially identified which reduced to 101 episodes in 100 girls when just including cases where the GP could be contacted, at least one vaccine dose was given, and GBS was confirmed or classed as probable. Nine, 14 and 24GBS admissions occurred within 3, 6, 12months of a dose respectively. The relative incidence (RI) for the 3month risk period was 1.04 (95% confidence interval 0.47-2.28), for the 6month period 0.83 (0.41-1.69) and for the 12month period 1.10 (0.57-2.14). When restricting to 79 confirmed cases the RI in the 3month risk period was 1.26 (0.55-2.92) and the RI 1.61 (0.39-6.54) for quadrivalent vaccine compared to 0.84 (0.30-2.34) for bivalent. CONCLUSION: We found no evidence of an increased risk of GBS following HPV vaccination in England and, based on the upper end of the 95% CI for the RI and the number of HPV vaccine doses given in England, can exclude a risk of about 1 per million doses.

Baril, L., D. Rosillon, C. Willame, M. G. Angelo, J. Zima, J. H. van den Bosch, T. Van Staa, R. Boggon, E. M. Bunge, S. Hernandez-Diaz and C. D. Chambers (2015). "**Risk of spontaneous abortion and other pregnancy outcomes in 15-25 year old women exposed to human papillomavirus-16/18 AS04-adjuvanted vaccine in the United Kingdom**." Vaccine **33**(48): 6884-6891.

BACKGROUND: We assessed the risk of spontaneous abortion (SA) after inadvertent exposure to HPV-16/18-vaccine during pregnancy using an observational cohort design. METHODS: The study population included women aged 15-25 years registered with the Clinical Practice Research Datalink General Practice OnLine Database in the United Kingdom (UK), who received at least one HPV-16/18-vaccine dose between 1st September 2008 and 30th June 2011. Exposed women had the first day of gestation between 30 days before and 45 days (90 days for the extended exposure period) after any HPV-16/18-vaccine dose. Non-exposed women had the first day of gestation 120 days-18 months after the last dose. SA defined as foetal loss between weeks 1 and 23 of gestation (UK definition). RESULTS: The frequency of SA was 11.6% (among 207 exposed) and 9.0% (632 non-exposed), women: hazard ratio (HR) adjusted for age at first day of gestation 1.30 (95% confidence interval: 0.79-2.12). Sensitivity analysis per number of doses administered (-30 to +45-day risk period) showed a HR for SA of 1.11 (0.64-1.91) for 18/178 women with one dose during the risk period versus 2.55 (1.09-5.93) in 6/29 women with two doses within a 4-5 weeks period. The proportion of pre-term/full-term/postterm deliveries, small/large for gestational age infants, and birth defects was not significantly different between exposed and non-exposed women. Results were consistent using a (United States) SA definition of foetal loss between weeks 1-19 and/or the extended risk period. CONCLUSION: There was no evidence of an increased risk of SA and other adverse pregnancy outcomes in young women inadvertently HPV-16/18-vaccinated around gestation. Nevertheless, women who are pregnant or trying to become pregnant are advised to postpone vaccination until completion of pregnancy.

Baron, J., P. Beresford, J. Gould, K. Patel, P. Nash and M. Freer (2014). "**Time to vaccinate boys against HPV infection and cancer, say parliamentarians with special interest in public health**." Bmj **349**: g5789.

Batista Ferrer, H., C. L. Trotter, M. Hickman and S. Audrey (2016). "**Barriers and facilitators to uptake of the school-based HPV vaccination programme in an ethnically diverse group of young women**." J Public Health (Oxf) **38**(3): 569-577.

BACKGROUND: To identify the barriers and facilitators to uptake of the HPV vaccine in an ethnically diverse group of young women in the south west of England. METHODS: Three school-based vaccination sessions were observed. Twenty-three young women aged 12 to 13 years, and six key informants, were interviewed between October 2012 and July 2013. Data were analysed using thematic analysis and the Framework method for data management. RESULTS: The priority given to preventing cervical cancer in this age group influenced whether young women received the HPV vaccine. Access could be affected by differing levels of commitment by school staff, school nurses, parents and young women to ensure parental consent forms were returned. Beliefs and values, particularly relevant to minority ethnic groups, in relation to adolescent sexual activity may affect uptake. Literacy and language difficulties undermine informed consent and may prevent vaccination. CONCLUSIONS: The school-based HPV vaccination programme successfully reaches the majority of young women. However, responsibility for key aspects remain unresolved which can affect delivery and prevent uptake for some groups. A multi-faceted approach, targeting appropriate levels of the socio-ecological model, is required to address procedures for consent and cultural and literacy barriers faced by

minority ethnic groups, increase uptake and reduce inequalities.

Bayley, J., D. Mesher, T. Nadarzynski and K. Soldan (2014). "**Age distribution in men who have sex with men attending genito-urinary medicine services in England: implications for targeted HPV vaccination**." HIV Med **15**: 85-85.

Benard, V. B., P. E. Castle, S. A. Jenison, W. C. Hunt, J. J. Kim, J. Cuzick, J. H. Lee, R. Du, M. Robertson, S. Norville and C. M. Wheeler (2017). "**Population-Based Incidence Rates of Cervical Intraepithelial Neoplasia in the Human Papillomavirus Vaccine Era**." JAMA Oncol **3**(6): 833-837.

Importance: A substantial effect of human papillomavirus (HPV) vaccines on reducing HPV-related cervical disease is essential before modifying clinical practice guidelines in partially vaccinated populations. Objective: To determine the population-based cervical intraepithelial neoplasia (CIN) trends when adjusting for changes in cervical screening practices that overlapped with HPV vaccination implementation. Design, Setting, and Participants: The New Mexico HPV Pap Registry, which captures population-based estimates of both cervical screening prevalence and CIN, was used to compute CIN trends from January 1, 2007, to December 31, 2014. Under New Mexico Administrative Code, the New Mexico HPV Pap Registry, a statewide public health surveillance program, receives mandatory reporting of all cervical screening (cytologic and HPV testing) and any cervical, vulvar, and vaginal histopathological findings for all women residing in New Mexico irrespective of outcome. Main Outcome Measures: Prespecified outcome measures included low-grade CIN (grade 1 [CIN1]) and high-grade CIN (grade 2 [CIN2] and grade 3 [CIN3]). Results: From 2007 to 2014, a total of 13520 CIN1, 4296 CIN2, and 2823 CIN3 lesions were diagnosed among female individuals 15 to 29 years old. After adjustment for changes in cervical screening across the period, reductions in the CIN incidence per 100000 women screened were significant for all grades of CIN among female individuals 15 to 19 years old, dropping from 3468.3 to 1590.6 for CIN1 (annual percentage change [APC], -9.0; 95% CI, -12.0 to -5.8; P < .001), from 896.4 to 414.9 for CIN2 (APC, -10.5; 95% CI, -18.8 to -1.2; P = .03), and from 240.2 to 0 for CIN3 (APC, -41.3; 95% CI, -65.7 to 0.3; P = .05). Reductions in the CIN2 incidence were also significant for women 20 to 24 years old, dropping from 1027.7 to 627.1 (APC, -6.3; 95% CI, -10.9 to -1.4; P = .02). Conclusions and Relevance: Population-level decreases in CIN among cohorts partially vaccinated for HPV may be considered when clinical practice guidelines for cervical cancer screening are reassessed. Evidence is rapidly growing to suggest that further increases in raising the age to start screening are imminent, one step toward integrating screening and vaccination.

Bhatia, R., K. Kavanagh, H. A. Cubie, I. Serrano, H. Wennington, M. Hopkins, J. Pan, K. G. Pollock, T. J. Palmer and K. Cuschieri (2016). "**Use of HPV testing for cervical screening in vaccinated women--Insights from the SHEVa (Scottish HPV Prevalence in Vaccinated Women) study**." Int J Cancer **138**(12): 2922-2931.

The management of cervical disease is changing worldwide as a result of HPV vaccination and the increasing use of HPV testing for cervical screening. However, the impact of vaccination on the performance of HPV based screening strategies is unknown. The SHEVa (Scottish HPV Prevalence in Vaccinated women) projects are designed to gain insight into the impact of vaccination on the performance of clinically validated HPV assays. Samples collated from women attending for first cervical smear who had been vaccinated as part of a national "catch-up" programme were tested with three clinically validated HPV assays (2 DNA and 1 RNA). Overall HR-HPV and type specific positivity was assessed in total population and according to

underlying cytology and compared to a demographically equivalent group of unvaccinated women. HPV prevalence was significantly lower in vaccinated women and was influenced by assay-type, reducing by 23-25% for the DNA based assays and 32% for the RNA assay ($p = 0.0008$). All assays showed over 75% reduction of HPV16 and/or 18 ($p < 0.0001$) whereas the prevalence of non 16/18 HR-HPV was not significantly different in vaccinated vs unvaccinated women. In women with low grade abnormalities, the proportion associated with non 16/18 HR-HPV was significantly higher in vaccinated women ($p < 0.0001$). Clinically validated HPV assays are affected differentially when applied to vaccinated women, dependent on assay chemistry. The increased proportion of non HPV16/18 infections may have implications for clinical performance, consequently, longitudinal studies linking HPV status to disease outcomes in vaccinated women are warranted.

Bowyer, H. L., R. H. Dodd, L. A. Marlow and J. Waller (2014). "**Association between human papillomavirus vaccine status and other cervical cancer risk factors**." Vaccine **32**(34): 4310-4316.

Little is known about the relationship between HPV vaccine uptake and other risk factors for cervical cancer. This study aimed to measure the association between vaccine status and cervical cancer risk factors in adolescent girls. Girls (15-16 years) from the first two cohorts to be offered routine HPV vaccination in the NHS immunisation programme completed a survey 3 years post-vaccination. Recruitment took place at 13 schools in London. Of 2768 girls registered in Year 11, 1912 (69%) took part and provided analysable data. Questions assessed vaccine status, demographic characteristics, smoking status, sexual behaviour and intention to attend cervical screening. Overall, 78% had completed the three-dose vaccine course. There was no association between vaccine status and smoking behaviour or sexual experience. In adjusted analyses, girls from black or 'other' ethnic backgrounds were less likely to be fully-vaccinated than those from white backgrounds. Those with low intentions to attend cervical screening were less likely to be fully vaccinated than those with high intentions. Efforts will be needed to ensure that unvaccinated women understand the importance of cervical screening when they reach the age that screening begins. Ethnic inequalities in vaccine coverage need to be explored further.

Bowyer, H. L., A. S. Forster, L. A. Marlow and J. Waller (2014). "**Predicting human papillomavirus vaccination behaviour among adolescent girls in England: results from a prospective survey**." J Fam Plann Reprod Health Care **40**(1): 14-22.

BACKGROUND: To maximise the benefits of human papillomavirus (HPV) vaccination, uptake needs to be high. We examined psychosocial predictors of HPV vaccine uptake and the association between vaccine intention and uptake 1 year later in adolescent girls (aged 16-17 years) in England. METHOD: Adolescent girls in the catch-up cohort were recruited from colleges in the South East of England in 2009 and 2010. Participants completed a questionnaire 6 months before (n=606) and 6 months after (n=214) being offered the vaccine, which assessed vaccine intention, vaccine uptake, demographics and attitudes based on the Health Belief Model and Theory of Planned Behaviour. RESULTS: A number of demographic and psychological factors, including intention, showed associations with vaccine uptake in uni-variable analyses. In multi-variable analyses, only ethnicity was independently associated with vaccine uptake. Participants from Black or 'Other' ethnic backgrounds were less likely to have received the HPV vaccine than White participants. CONCLUSIONS: More research is needed to help understand variation in vaccine coverage between ethnic groups.

Bowyer, H. L., L. A. Marlow, S. Hibbitts, K. G. Pollock and J. Waller (2013). "**Knowledge and awareness of HPV and the HPV vaccine among young women in the first routinely vaccinated cohort in England**." Vaccine **31**(7): 1051-1056.

A national school-based human papillomavirus (HPV) vaccination programme has been available for 12-13 year old females in the UK since 2008, offering protection against HPV types 16 and 18, which are responsible for the majority of cervical cancer. Little is known about HPV knowledge in girls who have been offered the vaccine. Girls offered the school-based vaccine in the first routine cohort (n=1033) were recruited from 13 schools in London three years post-vaccination. Participants completed a questionnaire about HPV awareness, knowledge about HPV and the vaccine, and demographic characteristics including vaccine status. About a fifth of the girls reported they were unaware of the HPV infection. Among those who reported being aware of HPV (n=759) knowledge was relatively low. Approximately half of the participants knew that HPV infection causes cervical cancer, condoms can reduce the risk of transmission and that cervical screening is needed regardless of vaccination status. These results are helpful in benchmarking HPV-related knowledge in vaccinated girls and could be used in the development of appropriate educational messages to accompany the first cervical screening invitation in this cohort in the future.

Bowyer, H. L., L. A. V. Marlow, S. Hibbitts, K. G. Pollock and J. Waller (2013). "**Knowledge and awareness of HPV and the HPV vaccine among young women in the first routinely vaccinated cohort in England**." Vaccine **31**(7): 1051-1056.

A national school-based human papillomavirus (HPV) vaccination programme has been available for 12-13 year old females in the UK since 2008, offering protection against HPV types 16 and 18, which are responsible for the majority of cervical cancer. Little is known about HPV knowledge in girls who have been offered the vaccine. Girls offered the school-based vaccine in the first routine cohort (n = 1033) were recruited from 13 schools in London three years post-vaccination. Participants completed a questionnaire about HPV awareness, knowledge about HPV and the vaccine, and demographic characteristics including vaccine status. About a fifth of the girls reported they were unaware of the HPV infection. Among those who reported being aware of HPV (n = 759) knowledge was relatively low. Approximately half of the participants knew that HPV infection causes cervical cancer, condoms can reduce the risk of transmission and that cervical screening is needed regardless of vaccination status. These results are helpful in benchmarking HPV-related knowledge in vaccinated girls and could be used in the development of appropriate educational messages to accompany the first cervical screening invitation in this cohort in the future. (C) 2012 Elsevier Ltd. All rights reserved.

Brunton, C. G., I. Farver, M. Jager, A. Lenneis, K. Parve, D. Patarcic, D. Petrova, R. Hogg, C. Kennedy, R. Garcia-Retamero and I. Todorova (2014). "**Young Women's Constructions of the HPV Vaccine: A Cross-Cultural, Qualitative Study in Scotland, Spain, Serbia and Bulgaria**." Int J Behav Med **21**(1): 11-19.

Background: Following international trends, the HPV (human papilloma virus) vaccine was introduced in Europe for protection against infection from common strands of the HPV virus which can lead to cervical cancer. Young women aged 18-26 years are at greatest risk of infection by the HPV virus yet have been neglected in research, policy, and practice. Purpose: To explore young women's constructions of the HPV vaccine in four European countries with different implementation policies ranging from national school-based programmes, regarded as the gold standard, to regional on-demand and private provision. Method: Qualitative methods comprising 11 focus group discussions with 54 young women aged 18-26, in Scotland (n = 10),

Spain (n = 25), Serbia (n = 9) and Bulgaria (n = 10). A discursive analysis was conducted, following an initial thematic analysis. Results: Two competing discursive constructions were considered: the 'responsible young woman' discourse was constructed as someone with individual rights to health, choice and discretion along with responsibilities to protect health and make rational decisions. In 'the HPV vaccine: a discourse of exclusion', access to the vaccine, wider health promotion and knowledge was controlled by others which had the potential to undermine the young woman's health. We consider how young women managed this tension through recourse to being health vigilant. Conclusion: Qualitative, cross-cultural research highlighted common concerns amongst young European women towards being responsible citizens in the face of their health and highlighted socio-cultural constraints to knowledge and resources. We highlight cross-cultural implications particularly between Western and Eastern European contexts.

Cameron, R. L., S. Ahmed and K. G. Pollock (2016). "**Adverse event monitoring of the human papillomavirus vaccines in Scotland**." Intern Med J **46**(4): 452-457.

BACKGROUND: Human papillomavirus (HPV) vaccines are currently utilised globally in national immunisation programmes. While evidence from clinical trials and epidemiological studies suggest that the HPV vaccines are both effective and safe, concerns about the safety of the vaccine and scientifically unproven associations with severe adverse events following immunisation have led to dramatic decreases in vaccine uptake in Japan and acceptance issues in other countries. AIM: In Scotland, we utilised hospital admissions data to assess the impact of the HPV immunisation programme on the incidence of 60 diagnoses between 2004 and 2014 in both girls and boys; with boys acting as a comparator group. METHODS: Tabular and graphical outputs of the number of admissions, the incidence and the incidence ratio of 59 diagnoses were created to assess trends before and after the introduction of the HPV vaccine. Data linkage was utilised to investigate further the increase in Bell palsy diagnoses. RESULTS: Fifty-four diagnoses showed no change in incidence following the introduction of the national immunisation programme, and while small increases in incidence were observed for Bell palsy, coeliac disease, ovarian dysfunction, juvenile onset of type 1 diabetes, demyelinating disease and juvenile rheumatoid arthritis, none was statistically significant. CONCLUSIONS: Consistent with previous evidence, we present disaggregate data that reiterate the safety of both HPV vaccines.

Cameron, R. L., K. Kavanagh, D. Cameron Watt, C. Robertson, K. Cuschieri, S. Ahmed and K. G. Pollock (2017). "**The impact of bivalent HPV vaccine on cervical intraepithelial neoplasia by deprivation in Scotland: reducing the gap**." J Epidemiol Community Health **71**(10): 954-960.

BACKGROUND: Cervical cancer disproportionately affects women from lower socioeconomic backgrounds. A human papillomavirus (HPV) vaccination programme was introduced in Scotland in 2008 with uptake being lower and inequitable in a catch-up cohort run for the first three years of the programme compared with the routine programme. The socioeconomic differences in vaccine uptake have the potential to further increase the inequality gap in regards to cervical disease. METHODS: Vaccination status was linked to demographic, cytological and colposcopic data, which are routinely collected by the Scottish HPV surveillance system. Incidence rates and relative risk of cervical intraepithelial neoplasia (CIN) 1, 2 and 3 in unvaccinated and vaccinated women were stratified by birth year and deprivation status using Poisson regression. RESULTS: Women who received three doses of HPV vaccine have significantly decreased risk of CIN 1, 2 and 3. Vaccine effectiveness was greater in those women from the most deprived backgrounds against CIN 2 and 3 lesions. Compared with the most deprived, unvaccinated women, the

relative risk of CIN 3 in fully vaccinated women in the same deprivation group was 0.29 (95% CI 0.2 to 0.43) compared with 0.62 (95% CI 0.4 to 0.97) in vaccinated women in the least-deprived group. CONCLUSIONS: The HPV vaccine is associated with significant reductions in both low-grade and high-grade CIN for all deprivation categories. However, the effect on high-grade disease was most profound in the most-deprived women. These data are welcoming and allay the concern that inequalities in cervical cancer may persist or increase following the introduction of the vaccine in Scotland.

Cameron, R. L., K. Kavanagh, J. Pan, J. Love, K. Cuschieri, C. Robertson, S. Ahmed, T. Palmer and K. G. Pollock (2016). "**Human Papillomavirus Prevalence and Herd Immunity after Introduction of Vaccination Program, Scotland, 2009-2013**." Emerg Infect Dis **22**(1): 56-64.

In 2008, a national human papillomavirus (HPV) immunization program using a bivalent vaccine against HPV types 16 and 18 was implemented in Scotland along with a national surveillance program designed to determine the longitudinal effects of vaccination on HPV infection at the population level. Each year during 2009-2013, the surveillance program conducted HPV testing on a proportion of liquid-based cytology samples from women undergoing their first cervical screening test for precancerous cervical disease. By linking vaccination, cervical screening, and HPV testing data, over the study period we found a decline in HPV types 16 and 18, significant decreases in HPV types 31, 33, and 45 (suggesting cross-protection), and a nonsignificant increase in HPV 51. In addition, among nonvaccinated women, HPV types 16 and 18 infections were significantly lower in 2013 than in 2009. Our results preliminarily indicate herd immunity and sustained effectiveness of the bivalent vaccine on virologic outcomes at the population level.

Cameron, R. L., K. Kavanagh, D. C. Watt, C. Robertson, K. Cuschieri, S. Ahmed and K. G. Pollock (2017). "**The impact of bivalent HPV vaccine on cervical intraepithelial neoplasia by deprivation in Scotland: reducing the gap**." J Epidemiol Community Health **71**(10): 954-960.

Background Cervical cancer disproportionately affects women from lower socioeconomic backgrounds. A human papillomavirus (HPV) vaccination programme was introduced in Scotland in 2008 with uptake being lower and inequitable in a catch-up cohort run for the first three years of the programme compared with the routine programme. The socioeconomic differences in vaccine uptake have the potential to further increase the inequality gap in regards to cervical disease. Methods Vaccination status was linked to demographic, cytological and colposcopic data, which are routinely collected by the Scottish HPV surveillance system. Incidence rates and relative risk of cervical intraepithelial neoplasia (CIN) 1, 2 and 3 in unvaccinated and vaccinated women were stratified by birth year and deprivation status using Poisson regression. Results Women who received three doses of HPV vaccine have significantly decreased risk of CIN 1, 2 and 3. Vaccine effectiveness was greater in those women from the most deprived backgrounds against CIN 2 and 3 lesions. Compared with the most deprived, unvaccinated women, the relative risk of CIN 3 in fully vaccinated women in the same deprivation group was 0.29 (95% CI 0.2 to 0.43) compared with 0.62 (95% CI 0.4 to 0.97) in vaccinated women in the least-deprived group. Conclusions The HPV vaccine is associated with significant reductions in both low-grade and high-grade CIN for all deprivation categories. However, the effect on high-grade disease was most profound in the most-deprived women. These data are welcoming and allay the concern that inequalities in cervical cancer may persist or increase following the introduction of the vaccine in Scotland.

Canvin, M., K. Sinka, G. Hughes and D. Mesher (2017). "**Decline in genital warts diagnoses among young women and young men since the introduction of the bivalent HPV (16/18) vaccination programme in England: an ecological analysis**." Sex Transm Infect **93**(2): 125-128.

BACKGROUND: For several decades, diagnoses of genital warts at genitourinary medicine (GUM) clinics in England had been increasing. In 2008, a national human papillomavirus (HPV) vaccination programme was introduced using the bivalent vaccine (types 16 and 18 only). A decrease in genital warts was not anticipated. However, rates of genital warts in GUM clinics have declined significantly since the introduction of the vaccine. METHODS: Using data from GUM clinics across England, we analysed rates of genital warts by age, gender, sexual orientation and estimated vaccine coverage. RESULTS: The reduction in rates of genital warts diagnoses at GUM clinics between 2009 and 2014 was 30.6% among young women aged 15-19 years and 25.4% among same age heterosexual young men. Overall there was an association showing higher warts reduction with increasing vaccination coverage with the largest declines in warts diagnoses observed in young women aged 15 years (50.9%) with the highest vaccination coverage. No such declines were observed in men who have sex with men (MSM) of the same age. CONCLUSION: The results of these ecological analyses are strongly in keeping with the bivalent HPV vaccine providing modest protection against genital warts.

Carnegie, E., A. Whittaker, C. Gray Brunton, R. Hogg, C. Kennedy, S. Hilton, S. Harding, K. G. Pollock and J. Pow (2017). "**Development of a cross-cultural HPV community engagement model within Scotland**." Health Educ J **76**(4): 398-410.

OBJECTIVE: To examine cultural barriers and participant solutions regarding acceptance and uptake of the human papillomavirus (HPV) vaccine from the perspective of Black African, White-Caribbean, Arab, Indian, Bangladeshi and Pakistani young people. METHODS: In total, 40 young people from minority ethnic communities in Scotland took part in a qualitative study, involving seven focus groups and four paired interviews, to explore their views and experiences of the HPV vaccine. Using critical discursive psychology, the analysis focused on young people's accounts of barriers and enablers to information, access and uptake of the HPV vaccination programme. RESULTS: Participants suggested innovative strategies to tackle intergenerational concerns, information design and accessibility, and public health communications across diverse contexts. A cross-cultural community engagement model was developed, embracing diversity and contradiction across different ethnic groups. This included four inter-related strategies: providing targeted and flexible information for young people, vaccine provision across the life-course, intergenerational information and specific cross-cultural communications. CONCLUSION: This is the first HPV cross-cultural model inductively derived from accounts of young people from different ethnic communities. We recommend public health practitioners and policymakers consider using the processes and strategies within this model to increase dialogue around public engagement, awareness and receptivity towards HPV vaccination.

Castanon, A. and P. Sasieni (2015). "**Treatment of stage I cervical cancer in England: results from the national audit of cervical screening**." Eur J Cancer Care (Engl) **24**: 22-22.

Clarke, E., C. Board, N. Patel, L. Atkinson, H. Tulloch and R. Patel (2014). "**Why are anogenital warts diagnoses decreasing in the U.K.: bivalent human papillomavirus (HPV) vaccine cross-protection or failure to examine?**" Sex Transm Infect **90**(8): 587.

Coles, V. A., R. Chapman, T. Lanitis and S. M. Carroll (2016). "**The costs of managing genital warts in the UK by devolved nation: England, Scotland, Wales and Northern Ireland**." Int J STD AIDS **27**(1): 51-57.

Genital warts, 90% of which are caused by human papillomavirus types 6 and 11, are a significant problem in the UK. The cost of managing genital warts was previously estimated at pound52.4 million for 2010. The objective of this study was to estimate the cost of genital warts management up to 2012 in the UK and by jurisdiction. Population statistics and the number of reported genital warts cases in genito-urinary medicine clinics were obtained and extrapolated to 2012. Cases of genital warts treated in primary care were estimated from The Health Improvement Network database. The number of visits and therapy required were estimated by genito-urinary medicine experts. Costs were obtained from the appropriate national tariffs. The model estimated there were 220,875 genital warts cases in the UK in 2012, costing pound58.44 million (pound265/patient). It estimated 157,793 cases in England costing pound41.74 million; 7468 cases in Scotland costing pound1.90 million; 7095 cases in Wales costing pound1.87 million; and 3621 cases in Northern Ireland costing pound948,000. The full National Health Service costs for the management of genital warts have never previously been estimated separately for each jurisdiction. Findings reveal a significant economic burden, which is important to quantify when understanding the value of quadrivalent human papilloma virus vaccination.

Conway, D. I., C. Robertson, H. Gray, L. Young, L. M. McDaid, A. J. Winter, C. Campbell, J. Pan, K. Kavanagh, S. Kean, R. Bhatia, H. Cubie, J. E. Clarkson, J. Bagg, K. G. Pollock and K. Cuschieri (2016). "**Human Papilloma Virus (HPV) Oral Prevalence in Scotland (HOPSCOTCH): A Feasibility Study in Dental Settings**." PLoS One **11**(11): e0165847.

The purpose of this study was to test the feasibility of undertaking a full population investigation into the prevalence, incidence, and persistence of oral Human Papilloma Virus (HPV) in Scotland via dental settings. Male and female patients aged 16-69 years were recruited by Research Nurses in 3 primary care and dental outreach teaching centres and 2 General Dental Practices (GDPs), and by Dental Care Teams in 2 further GDPs. Participants completed a questionnaire (via an online tablet computer or paper) with socioeconomic, lifestyle, and sexual history items; and were followed up at 6-months for further questionnaire through appointment or post/online. Saline oral gargle/rinse samples, collected at baseline and follow-up, were subject to molecular HPV genotyping centrally. 1213 dental patients were approached and 402 individuals consented (participation rate 33.1%). 390 completed the baseline questionnaire and 380 provided a baseline oral specimen. Follow-up rate was 61.6% at 6 months. While recruitment was no different in Research Nurse vs Dental Care Team models the Nurse model ensured more rapid recruitment. There were relatively few missing responses in the questionnaire and high levels of disclosure of risk behaviours (99% answered some of the sexual history questions). Data linkage of participant data to routine health records including HPV vaccination data was successful with 99.1% matching. Oral rinse/gargle sample collection and subsequent HPV testing was feasible. Preliminary analyses found over 95% of samples to be valid for molecular HPV detection prevalence of oral HPV infection of 5.5% (95%CI 3.7, 8.3). It is feasible to recruit and follow-up dental patients largely representative / reflective of the wider population, suggesting it would be possible to undertake a study to investigate the prevalence, incidence, and determinants of oral HPV infection in dental settings.

Cruickshank, M. E., J. Pan, S. C. Cotton, K. Kavanagh, C. Robertson, K. Cuschieri, H. Cubie, T. Palmer and K. G. Pollock (2017). "**Reduction in colposcopy workload and associated clinical activity following human papillomavirus (HPV) catch-up vaccination programme in Scotland: an ecological study**." Bjog **124**(9): 1386-1393.

OBJECTIVE: To measure patterns of clinical activity at colposcopy before and after vaccinated women entered the Scottish Cervical Screening Programme (SCSP). DESIGN: Population-based observational study using nationally collected data. SETTING: Scottish colposcopy clinics. SAMPLE: All women with a date of birth on or after 1 January 1985 who attended colposcopy in Scotland between 2008 and 2014. METHODS: Routinely collected data from the Scottish National Colposcopy Clinical Information Audit System (NCCIAS) were extracted, including: referral criteria, referral cervical cytology, colposcopic findings, clinical procedures, and histology results. Analysis was restricted to those referred to colposcopy at age 20 or 21 years. MAIN OUTCOME MEASURES: Referral criteria, positive predictive value of colposcopy, default rates, and rates of cervical biopsies and treatments. RESULTS: A total of 7372 women referred for colposcopy at age 20 or 21 years were identified. There was a downward trend in the proportion of those referred with abnormal cytology (2008/9, 91.0%; 2013/14, 90.3%; linear trend P = 0.03). Women were less likely to have diagnostic or therapeutic interventions. The proportion with no biopsy (2008/9, 19.5%; 2013/14, 26.9%; linear trend P < 0.0001) and no treatment (2008/9, 74.9%; 2013/14, 91.8%; linear trend P < 0.0001) increased over the period of observation. CONCLUSIONS: A reduction in clinical activity related to abnormal screening referrals is likely to be associated with the human papillomavirus (HPV) catch-up immunisation programme. Referral criteria and the service provision of colposcopy needs to be planned carefully, taking account of the increasing number of women who have been immunised against HPV that will be entering cervical screening programmes worldwide. TWEETABLE ABSTRACT: Colposcopy referral criteria and service planning need attention following HPV immunisation programme.

Cuschieri, K., K. Kavanagh, C. Moore, R. Bhatia, J. Love and K. G. Pollock (2016). "**Impact of partial bivalent HPV vaccination on vaccine-type infection: a population-based analysis**." Br J Cancer **114**(11): 1261-1264.

BACKGROUND: Data on the effectiveness of one dose of HPV vaccine are lacking, particularly in population-based settings. Data from a national HPV immunisation catch-up programme of 14-18-year-old girls were used to assess the effectiveness of<3 doses of the bivalent vaccine on vaccine-type and cross-reactive-type HPV infection. METHODS: Cervical samples from women attending for their first cervical smear, which had been genotyped for HPV as part of a longitudinal HPV surveillance programme were linked to immunisation records to establish the number of vaccine doses (0, 1, 2 and 3) administered. Vaccine effectiveness (VE) adjusted for deprivation and age at first dose, was assessed for prevalent HPV 16/18 and HPV 31/33/45 infection. RESULTS: VE for prevalent HPV 16/18 infection associated with 1, 2 and 3 doses was 48.2% (95% CI 16.8, 68.9), 54.8% (95% CI 30.7, 70.8) and 72.8% (95% CI 62.8, 80.3). Equivalent VE for prevalent HPV 31/33/45 infection was -1.62% (95% CI -85.1, 45.3), 48.3% (95% CI 7.6, 71.8) and 55.2% (95% CI 32.6, 70.2). CONCLUSIONS: Consistent with recent aggregated trial data, we demonstrate the potential effectiveness of even one dose of HPV vaccine on vaccine-type infection. Given that these women were immunised as part of a catch-up campaign, the VE observed in this study is likely to be an underestimate of what will occur in girls vaccinated at younger ages. Further population-based studies which look at the clinical efficacy of one-dose schedules are warranted.

Demarteau, N., T. Breuer and B. Standaert (2012). "**Selecting a mix of prevention strategies against cervical cancer for maximum efficiency with an optimization program**." Pharmacoeconomics **30**(4): 337-353.

BACKGROUND: Screening and vaccination against human papillomavirus (HPV) can protect against cervical cancer. Neither alone can provide 100% protection. Consequently it raises the important question about the most efficient combination of screening at specified time intervals and vaccination to prevent cervical cancer. OBJECTIVE: Our objective was to identify the mix of cervical cancer prevention strategies (screening and/or vaccination against HPV) that achieves maximum reduction in cancer cases within a fixed budget. METHODS: We assessed the optimal mix of strategies for the prevention of cervical cancer using an optimization program. The evaluation used two models. One was a Markov cohort model used as the evaluation model to estimate the costs and outcomes of 52 different prevention strategies. The other was an optimization model in which the results of each prevention strategy of the previous model were entered as input data. The latter model determined the combination of the different prevention options to minimize cervical cancer under budget, screening coverage and vaccination coverage constraints. We applied the model in two countries with different healthcare organizations, epidemiology, screening practices, resource settings and treatment costs: the UK and Brazil. 100,000 women aged 12 years and above across the whole population over a 1-year period at steady state were included. The intervention was papanicolaou (Pap) smear screening programmes and/or vaccination against HPV with the bivalent HPV 16/18 vaccine (Cervarix(R) [Cervarix is a registered trademark of the GlaxoSmithKline group of companies]). The main outcome measures were optimal distribution of the population between different interventions (screening, vaccination, screening plus vaccination and no screening or vaccination) with the resulting number of cervical cancer and associated costs. RESULTS: In the base-case analysis (= same budget as today), the optimal prevention strategy would be, after introducing vaccination with a coverage rate of 80% in girls aged 12 years and retaining screening coverage at pre-vaccination levels (65% in the UK, 50% in Brazil), to increase the screening interval to 6 years (from 3) in the UK and to 5 years (from 3) in Brazil. This would result in a reduction of cervical cancer by 41% in the UK and by 54% in Brazil from pre-vaccination levels with no budget increase. Sensitivity analysis shows that vaccination alone at 80% coverage with no screening would achieve a cervical cancer reduction rate of 20% in the UK and 43% in Brazil compared with the pre-vaccination situation with a budget reduction of 30% and 14%, respectively. In both countries, the sharp reduction in cervical cancer is seen when the vaccine coverage rate exceeds the maximum screening coverage rate, or when screening coverage rate exceeds the maximum vaccine coverage rate, while maintaining the budget. As with any model, there are limitations to the value of predictions depending upon the assumptions made in each model. CONCLUSIONS: Spending the same budget that was used for screening and treatment of cervical cancer in the pre-vaccination era, results of the optimization program show that it would be possible to substantially reduce the number of cases by implementing an optimal combination of HPV vaccination (80% coverage) and screening at pre-vaccination coverage (65% UK, 50% Brazil) while extending the screening interval to every 6 years in the UK and 5 years in Brazil.

Dodd, R. H., L. A. Marlow, A. S. Forster and J. Waller (2016). "**Print and online newspaper coverage of the link between HPV and oral cancer in the UK: a mixed-methods study**." BMJ Open **6**(2): e008740.

OBJECTIVES: The role of human papillomavirus (HPV) in some oral cancers has been reported in the news press, though little is known about the content of these articles. This study aimed to

examine how frequently the link between HPV and oral cancer has been reported in the news press and to examine the content of these articles. DESIGN: UK media articles were searched for articles relating to oral cancer and HPV in the database NexisUK. Of 854 articles identified by the initial search, 112 were eligible for inclusion (2002-2014) and content analysis was used to determine the main themes discussed. RESULTS: Themes included actor Michael Douglas' claim that his throat cancer was caused by HPV, the riskiness of oral sex, health information (including HPV as a cause of oral cancer) and the need to vaccinate boys against HPV. Many articles also referred to the link between HPV and cervical cancer and the increasing incidence of HPV-related oral cancer. The largest peak in articles occurred when Michael Douglas discussed his cancer (June 2013). Facts about HPV and references to research were provided in some articles. CONCLUSIONS: The link between HPV and oral cancer and the transmission of HPV via oral sex was regularly discussed, yet coverage often lacked detailed health information. This could increase awareness of the link between oral sex and HPV risk, but may also lead to public concern about oral sex as a sexual behaviour.

Fisher, H., S. Audrey, J. A. Mytton, M. Hickman and C. Trotter (2014). "**Examining inequalities in the uptake of the school-based HPV vaccination programme in England: a retrospective cohort study**." J Public Health (Oxf) **36**(1): 36-45.

BACKGROUND: Although uptake of Human Papillomavirus (HPV) vaccine is high in the United Kingdom, it is unknown whether the programme has been delivered equitably by ethnicity or deprivation. This study aimed to investigate factors associated with HPV vaccine initiation and completion within the routine HPV vaccination programme in the South West of England. METHODS: Data were retrieved for young women eligible for routine vaccination from 2008/09 to 2010/11 from three Primary Care Trusts (PCTs)/local authorities. Multivariable logistic regression models were developed to examine factors associated with uptake of HPV vaccination. RESULTS: Of 14 282 eligible young women, 12 658 (88.6%) initiated, of whom 11 725 (92.6%) completed the course. Initiation varied by programme year (86.5-89.6%) and PCTs/local authorities (84.8-91.6%). There was strong evidence for an overall difference of initiation by ethnicity ($P < 0.001$), but not deprivation quintile ($P = 0.48$). Young women educated in non-mainstream educational settings were less likely to initiate and, if initiated, less likely to complete (both $P < 0.001$). CONCLUSIONS: HPV vaccination uptake did not vary markedly by social deprivation. However, associations with ethnicity and substantially lower uptake in non-mainstream educational settings were observed. Research to identify reasons for low vaccine uptake in these population groups is required.

FitzGerald, S., N. Cornally and J. Hegarty (2017). "**Men's perspectives on cancer prevention behaviors associated with HPV**." Psychooncology.

BACKGROUND: The human papillomavirus (HPV) is associated with the diagnosis of anal, penile, and oropharyngeal cancers in men. Evidence indicates that correct condom use in addition to obtaining the HPV vaccine provides the greatest protection from HPV infections. OBJECTIVE: To explore young men's beliefs and behavioral intention in relation to receiving the HPV vaccine and using a condom correctly and consistently for sexual contact. METHODS: A cross-sectional study underpinned by the theory of planned behavior (TPB) was conducted with male participants (n = 359, 18-28 years) who completed an online survey. Descriptive, correlational, and hierarchical regression analyses were performed on both status variables and variables of the TPB. RESULTS: Subjective norms (beta = 0.519, $P < .001$) was identified as the most influential predictor in relation to men's intention to receive the HPV vaccine, while relationship

status (beta = -0.215, P < .001) and attitudes (beta = 0.394, P < .001) presented as the most significant predictors of intention to use a condom. Summarily, 51% of the variance in intention to receive the HPV vaccine and 44% in intention to use a condom were explained by the TPB model. CONCLUSION: Results from this study will impact on future sexual health research, education programs, and interventions for both HPV preventative behaviors towards the elimination of HPV-related cancers in men.

Forster, A., L. Rockliffe, A. Chorley, L. Marlow, H. Bedford, S. Smith and J. Waller (2016). "**HPV VACCINATION IN GIRLS FROM ETHNIC MINORITY BACKGROUNDS IN THE UK**." Int J Behav Med **23**: S47-S47.

Forster, A. S., V. Cornelius, L. Rockliffe, L. A. Marlow, H. Bedford and J. Waller (2017). "**A cluster randomised feasibility study of an adolescent incentive intervention to increase uptake of HPV vaccination**." Br J Cancer **117**(8): 1121-1127.

BACKGROUND: Uptake of human papillomavirus (HPV) vaccination is suboptimal among some groups. We aimed to determine the feasibility of undertaking a cluster randomised controlled trial (RCT) of incentives to improve HPV vaccination uptake by increasing consent form return. METHODS: An equal-allocation, two-arm cluster RCT design was used. We invited 60 London schools to participate. Those agreeing were randomised to either a standard invitation or incentive intervention arm, in which Year 8 girls had the chance to win a pound50 shopping voucher if they returned a vaccination consent form, regardless of whether consent was provided. We collected data on school and parent participation rates and questionnaire response rates. Analyses were descriptive. RESULTS: Six schools completed the trial and only 3% of parents opted out. The response rate was 70% for the girls' questionnaire and 17% for the parents'. In the intervention arm, 87% of girls returned a consent form compared with 67% in the standard invitation arm. The proportion of girls whose parents gave consent for vaccination was higher in the intervention arm (76%) than the standard invitation arm (61%). CONCLUSIONS: An RCT of an incentive intervention is feasible. The intervention may improve vaccination uptake but a fully powered RCT is needed.

Forster, A. S., V. Cornelius, L. Rockliffe, L. A. V. Marlow, H. Bedford and J. Waller (2017). "**A protocol for a cluster randomised feasibility study of an adolescent incentive intervention to increase uptake of HPV vaccination among girls**." Pilot Feasibility Stud **3**: 13.

BACKGROUND: Uptake of the human papillomavirus (HPV) vaccine in the UK is good, but there are pockets of the community who remain unprotected. Immunisation teams usually require written parental consent for a girl to receive the vaccine. Evidence suggests that uptake of the vaccine might be improved by promoting consent form return (if returned, forms are likely to grant consent). Incentivising girls to return consent forms is a promising approach to promoting consent form return. Before testing the efficacy of an incentive intervention in a randomised controlled trial (RCT), we must first establish whether the RCT is feasible. In this randomised feasibility study, we aim to establish the feasibility of conducting a cluster RCT of an adolescent incentive intervention to increase uptake of HPV vaccination. METHODS: At least six schools will be randomised to either an incentive intervention arm or a standard invitation arm. Girls in standard invitation arm schools will receive the usual HPV vaccine programme invitation materials. Girls attending schools in the incentive intervention arm will receive the standard invitation and will also be told that they will receive an incentive if they return their consent form (regardless of whether consent is granted or denied). The incentive is being entered into a

prize draw to win a retail voucher. Feasibility objectives include estimating the schools' and parents' willingness to participate in the study and be randomised; response rates to questionnaires; the extent of missing data; the girls' and parents' attitudes towards the incentive offered; school staff experiences of participating, fidelity to the trial procedures, data on any unintended consequences and the possible mechanisms of action, and proof-of-concept evidence of the effect of the intervention on consent form return rates and uptake of the vaccine. Analysis of feasibility outcomes will primarily be descriptive. Consent form return rates and uptake of the vaccine will be presented by trial arm without comparison. DISCUSSION: Incentivising HPV vaccine consent form return may promote HPV vaccine uptake. This study will provide the evidence needed to establish whether testing this incentive intervention using a RCT design in the future is feasible. TRIAL REGISTRATION: ISRCTN72136061.

Forster, A. S., L. A. V. Marlow, J. Wardle, J. Stephenson and J. Waller (2012). "**Interest in having HPV vaccination among adolescent boys in England**." Vaccine **30**(30): 4505-4510.

Background and purpose: The United States' Centers for Disease Control and Prevention recommends that boys aged 11-12 be vaccinated against HPV to reduce the risk of genital warts and HPV-related cancers. No recommendation has been made in England although there have been calls to widen access to the vaccine. This study aimed to assess boys' willingness to have HPV vaccination, eliciting reasons for their decisions. Methods: 528 boys aged 16-18 years completed a questionnaire in school. Measures included demographic characteristics, HPV awareness, willingness to have the vaccine, and reasons for the vaccine decision. Coding of open responses was informed by social cognition model constructs. Results: A large proportion of the sample (41%) intended to have the vaccine, however, slightly more were unsure (49%) and a small number (10%) would not get vaccinated. Uncertainty was associated with lack of previous awareness of HPV and perceived lack of adequate information. Boys who would not have the vaccine did not feel at risk or did not see the need for it. Conclusion: These preliminary data suggest that HPV vaccination may be acceptable to boys, and confirm previous findings that information is vital in the decision-making process. (c) 2012 Elsevier Ltd. All rights reserved.

Forster, A. S., L. Rockliffe, L. A. V. Marlow, H. Bedford, E. McBride and J. Waller (2017). "**Exploring human papillomavirus vaccination refusal among ethnic minorities in England: A comparative qualitative study**." Psychooncology **26**(9): 1278-1284.

OBJECTIVES: In England, uptake of human papillomavirus (HPV) vaccination to prevent HPV-related cancer is lower among girls from ethnic minority backgrounds. We aimed to explore the factors that prevented ethnic minority parents from vaccinating, compared to White British nonvaccinating parents and vaccinating ethnic minority parents. METHODS: Interviews with 33 parents (n = 14 ethnic minority non-vaccinating, n = 10 White British nonvaccinating, and n = 9 ethnic minority vaccinating) explored parents' reasons for giving or withholding consent for HPV vaccination. Data were analysed using Framework Analysis. RESULTS: Concerns about the vaccine were raised by all nonvaccinating ethnic minority parents, and they wanted information to address these concerns. External and internal influences affected parents' decisions, as well as parents' perceptions that HPV could be prevented using means other than vaccination. Reasons were not always exclusive to nonvaccinating ethnic minority parents, although some were, including a preference for abstinence from sex before marriage. Only ethnic minority parents wanted information provided via workshops. CONCLUSIONS: Ethnic differences in HPV vaccination uptake may be partly explained by concerns that were only reported by parents from some ethnic groups. Interventions to improve uptake may need to tackle difficult topics

like abstinence from sex before marriage, and use a targeted format.

Forster, A. S. and J. Waller (2016). "**Taking stock and looking ahead: Behavioural science lessons for implementing the nonavalent human papillomavirus vaccine**." Eur J Cancer **62**: 96-102.

The development and licensing of a nonavalent human papillomavirus (HPV) vaccine has the potential to reduce morbidity and mortality from HPV-related cancers beyond that of first generation HPV vaccines. However, this benefit can only be realised if the offer of vaccination is accepted. Uptake of first generation HPV vaccines is not complete and shows huge global variation. In addition to practical and financial challenges to optimising coverage, behavioural issues explain a large proportion of the variance in vaccine receipt. This commentary draws on the findings of over a decade of behavioural science research seeking to understand uptake of first generation HPV vaccines, in order to anticipate challenges to implement the nonavalent HPV vaccine. Challenges include distrust of combination vaccines, uncertainty about long-term efficacy, distrust of a new and (perceived to be) untested vaccine, cost and uncertainty regarding interchanging doses of first generation and nonavalent vaccines and the appropriateness of revaccination. We use behavioural science theory and existing evaluations of interventions to increase uptake of vaccines to identify evidence-based approaches that can be implemented by vaccine stakeholders to address parents' concerns and maximise uptake of the nonavalent HPV vaccine.

Forster, A. S., J. Waller, H. L. Bowyer and L. A. Marlow (2015). "**Girls' explanations for being unvaccinated or under vaccinated against human papillomavirus: a content analysis of survey responses**." BMC Public Health **15**: 1278.

BACKGROUND: In England HPV vaccination is offered to all girls age 12-13 years, free-at-the-point-of-receipt, mostly in schools. Coverage is good, but around 20% of girls remain unvaccinated. This research sought to explore reasons for being un-/under vaccinated. METHODS: An ethnically diverse sample of girls aged 15-16 years attending one of twelve London schools completed a survey three years after being offered HPV vaccination. Girls reported their HPV vaccine status and those who were unvaccinated (had not received any doses of the vaccine) or under vaccinated (had not completed the recommended 3-dose course) recorded reasons for their un-/under vaccinated status. Reasons were reported using free-text and content analysis was used to analyse responses. RESULTS: Around 74% of un-/under vaccinated girls provided a reason for their vaccination status (n = 259). Among unvaccinated girls, the most common reasons related to lack of perceived need for vaccination, concerns about safety and lack of parental consent. Girls who were under vaccinated gave practical reasons, including the need for more information (e.g. not knowing that multiple doses were needed), administrative issues (e.g. school absence), health and procedural concerns (e.g. fear of needles). Descriptively, there were few differences in the reasons given between girls from different ethnic backgrounds. Girls from Black and Asian backgrounds more commonly thought that the vaccine was not needed. Lack of parental consent without providing further explanation was most often cited by girls from Black backgrounds. CONCLUSIONS: Safety concerns and lack of perceived need should be addressed to encourage informed uptake of HPV vaccination. Immunisation programme coordinators may be able to increase series completion by tackling practical problems facing under vaccinated girls.

Gulland, A. (2016). "**Boys should receive HPV vaccination, doctors urge government**." Bmj **353**: i3372.

Haskins-Coulter, T., J. Southern, N. Andrews and E. Miller (2017). "**Reactogenicity of Cervarix and Gardasil human papillomavirus (HPV) vaccines in a randomized single blind trial in healthy UK adolescent females**." Hum Vaccin Immunother **13**(6): 1-9.

One hundred and ninety eight females aged 12-15 y were enrolled in an observer-blinded randomized trial to assess the immunogenicity and reactogenicity of the tetravalent HPV vaccine Gardasil(R) (group 2), in comparison to the bivalent HPV vaccine, Cervarix(R) (group 1), which was routinely offered in the national vaccination schedule at the time. Participants were blinded to treatment group until all 3 vaccinations had been given, while laboratory staff were masked during testing. For the majority of local and general reactions, recipients of both vaccines reported comparable frequencies. Local and systemic events were rarely of high severity, except for tenderness at the injection site which reached a severe level after at least one of the doses in 24% of the Cervarix(R) group and 7% of the Gardasil(R) group (p = 0.001 comparing groups). For most reactions, no dose response was recorded, except for swelling with higher reporting at dose 3 (17.7%) than dose 1 (3.1%) for Cervarix(R). SAE reporting was low (n = 3) and considered unrelated to either vaccine. This paper supports the body of evidence that Gardasil(R) has an acceptable safety profile when compared with Cervarix(R) and other vaccines given in the national program.

Hawkes, S. and D. A. Lewis (2014). "**HPV vaccine strategies: equitable and effective?**" Sex Transm Infect **90**(7): 510-511.

Hendry, M., R. Lewis, A. Clements, S. Damery and C. Wilkinson (2013). "**"HPV? Never heard of it!": a systematic review of girls' and parents' information needs, views and preferences about human papillomavirus vaccination**." Vaccine **31**(45): 5152-5167.

BACKGROUND AND OBJECTIVE: Two human papillomavirus vaccines were licenced in 2006/2007 for cervical cancer prevention. National vaccination programmes for schoolgirls were subsequently introduced in some European countries, North America and Australia. To understand factors influencing vaccine uptake and to inform the development of appropriate UK educational materials, we aimed to synthesise evidence of girls' and parents' information needs, views and preferences regarding HPV vaccination. DESIGN: Systematic review and mixed method synthesis of qualitative and survey data. DATA SOURCES: Twelve electronic databases; bibliographies of included studies 1980 to August 2011. REVIEW METHODS: Two reviewers independently screened papers and appraised study quality. Studies were synthesised collaboratively using framework methods for qualitative data, and survey results integrated where they supported, contrasted or added to the themes identified. RESULTS: Twenty-eight qualitative studies and 44 surveys were included. Where vaccination was offered, uptake was high. Intention to decline was related to a preference for vaccinating later to avoid appearing to condone early sexual activity, concerns about vaccine safety and low perception of risk of HPV infection. Knowledge was poor and there were many misconceptions; participants tried to assess the potential benefits and harms of vaccination but struggled to interpret limited information about HPV in the context of existing knowledge about sexually transmitted infections and cancer. Conclusion Many girls and their parents have limited understanding to an extent that impinges on their ability to make informed choices about HPV vaccination and could impact on future uptake of cervical screening. This is a considerable challenge to those who design and provide information, but getting the messages right for this programme could help in

developing patient information about other HPV related cancers.

Herlihy, N., R. Hutubessy and M. Jit (2016). "**Current Global Pricing For Human Papillomavirus Vaccines Brings The Greatest Economic Benefits To Rich Countries**." Health Aff (Millwood) **35**(2): 227-234.

Vaccinating females against human papillomavirus (HPV) prior to the debut of sexual activity is an effective way to prevent cervical cancer, yet vaccine uptake in low- and middle-income countries has been hindered by high vaccine prices. We created an economic model to estimate the distribution of the economic surplus-the sum of all health and economic benefits of a vaccine, minus the costs of development, production, and distribution-among different country income groups and manufacturers for a cohort of twelve-year-old females in 2012. We found that manufacturers may have received economic returns worth five times their original investment in HPV vaccine development. High-income countries gained the greatest economic surplus of any income category, realizing over five times more economic value per vaccinated female than low-income countries did. Subsidizing vaccine prices in low- and middle-income countries could both reduce financial barriers to vaccine adoption and still allow high-income countries to retain their economic surpluses and manufacturers to retain their profits.

Howell-Jones, R., K. Soldan, S. Wetten, D. Mesher, T. Williams, O. N. Gill and G. Hughes (2013). "**Declining genital Warts in young women in england associated with HPV 16/18 vaccination: an ecological study**." J Infect Dis **208**(9): 1397-1403.

BACKGROUND: Diagnoses of genital warts (GW) in genitourinary medicine (GUM) clinics have been increasing in England for many years. In 2008, an HPV immunization program began with a bivalent vaccine (Cervarix). This was expected to markedly reduce infections and disease due to human papillomavirus (HPV) 16/18 but not HPV 6/11 infections or disease. However, from 2009 to 2011 there were decreases in reported diagnoses of GW in young females at GUM clinics. METHODS: Using data from GUM clinics and a sample of general practices (GPs) throughout England, we analyzed rates of GW diagnoses by age, year of diagnosis, and estimated immunization coverage. RESULTS: The overall reduction in GW diagnoses at GUM clinics between 2008 and 2011 was 13.3% among 16- to 19-year-old females, with the greatest decline of 20.8% in 17-year-olds. Declines were positively associated with estimated immunization coverage. A similar pattern was seen in GP diagnoses, but not among older women, and for other GUM consultations. CONCLUSIONS: Several factors might contribute to declines in GW. However, the size and pattern of the declines strongly suggest that we are observing an unexpected, moderately protective effect of HPV 16/18 vaccination against GW.

Hughes, A., D. Mesher, J. White and K. Soldan (2014). "**Coverage of the English national human papillomavirus (HPV) immunisation programme among 12 to 17 year-old females by area-level deprivation score, England, 2008 to 2011**." Euro Surveill **19**(2).

The English national human papillomavirus (HPV) immunisation programme has offered vaccination to girls aged 12 years at the start of each school year since September 2008. A catch-up programme has offered vaccination to girls up to 18 years. Delivery is predominantly school-based, with some general practitioner (GP)-based immunisation. The relationship between HPV immunisation coverage and deprivation (index of multiple deprivation, IMD) was assessed by geographical area (N=151) for each school year offered the HPV vaccine between 2008 to 2011 using the Spearman's rank correlation coefficient, and compared to that for adequate cervical screening of women aged 25 to 49 years. Coverage at age 12 showed no significant association with IMD at the area-level (p=0.12). Within the catch-up years, there was

some suggestion of higher deprivation being associated with lower coverage. This was not significant for girls offered immunisation under 16 years (in compulsory education) (p=0.09), but was more marked and statistically significant for older girls (p<0.0001). The proportion of women aged 25 to 49 years with an adequate cervical screen was negatively associated with deprivation (p<0.0001). School-based HPV immunisation delivery appears to be successfully reducing inequalities in cervical cancer control at area-level. However, the catch-up cohorts above the age of compulsory education may face increased inequality. Further investigation is needed into individual-level factors associated with coverage.

Huygen, F., K. Verschueren, C. McCabe, J. U. Stegmann, J. Zima, O. Mahaux, L. Van Holle and M. G. Angelo (2015). "**Investigating Reports of Complex Regional Pain Syndrome: An Analysis of HPV-16/18-Adjuvanted Vaccine Post-Licensure Data**." EBioMedicine **2**(9): 1114-1121.

Complex regional pain syndrome (CRPS) is a chronic pain disorder that typically follows trauma or surgery. Suspected CRPS reported after vaccination with human papillomavirus (HPV) vaccines led to temporary suspension of proactive recommendation of HPV vaccination in Japan. We investigated the potential CRPS signal in relation to HPV-16/18-adjuvanted vaccine (Cervarix(R)) by database review of CRPS cases with independent expert confirmation; a disproportionality analysis and analyses of temporality; an observed versus expected analysis using published background incidence rates; systematic reviews of aggregate safety data, and a literature review. The analysis included 17 case reports of CRPS: 10 from Japan (0.14/100,000 doses distributed) and seven from the United Kingdom (0.08/100,000). Five cases were considered by independent experts to be confirmed CRPS. Quantitative analyses did not suggest an association between CRPS and HPV-16/18-adjuvanted vaccine. Observed CRPS incidence after HPV-16/18 vaccination was statistically significantly below expected rates. Systematic database reviews using search terms varying in specificity and sensitivity did not identify new cases. No CRPS was reported during clinical development and no unexpected results found in the literature. There is not sufficient evidence to suggest an increased risk of developing CRPS following vaccination with HPV-16/18-adjuvanted vaccine. Post-licensure safety surveillance confirms the acceptable benefit-risk of HPV-16/18 vaccination.

Jackson, C., H. Bedford, F. M. Cheater, L. Condon, C. Emslie, L. Ireland, P. Kemsley, S. Kerr, H. J. Lewis, J. Mytton, K. Overend, S. Redsell, Z. Richardson, C. Shepherd, L. Smith and L. Dyson (2017). "**Needles, Jabs and Jags: a qualitative exploration of barriers and facilitators to child and adult immunisation uptake among Gypsies, Travellers and Roma**." BMC Public Health **17**(1): 254.

BACKGROUND: Gypsies, Travellers and Roma (referred to as Travellers) are less likely to access health services including immunisation. To improve immunisation rates, it is necessary to understand what helps and hinders individuals in these communities in taking up immunisations. This study had two aims. 1. Investigate the views of Travellers in the UK on the barriers and facilitators to acceptability and uptake of immunisations and explore their ideas for improving immunisation uptake; 2. Examine whether and how these responses vary across and within communities, and for different vaccines (childhood and adult). METHODS: This was a qualitative, cross-sectional interview study informed by the Social Ecological Model. Semi-structured interviews were conducted with 174 Travellers from six communities: Romanian Roma, English Gypsy/Irish Travellers (Bristol), English Gypsy (York), Romanian/Slovakian Roma, Scottish Show people (Glasgow) and Irish Traveller (London). The focus was childhood and selected adult vaccines. Data were analysed using the Framework approach. RESULTS: Common accounts of barriers and facilitators were identified across all six Traveller communities, similar

to those documented for the general population. All Roma communities experienced additional barriers of language and being in a new country. Men and women described similar barriers and facilitators although women spoke more of discrimination and low literacy. There was broad acceptance of childhood and adult immunisation across and within communities, with current parents perceived as more positive than their elders. A minority of English-speaking Travellers worried about multiple/combined childhood vaccines, adult flu and whooping cough and described barriers to booking and attending immunisation. Cultural concerns about antenatal vaccines and HPV vaccination were most evident in the Bristol English Gypsy/Irish Traveller community. Language, literacy, discrimination, poor school attendance, poverty and housing were identified as barriers across different communities. Trustful relationships with health professionals were important and continuity of care valued. CONCLUSIONS: The experience of many Travellers in this study, and the context through which they make health decisions, is changing. This large study identified key issues that should be considered when taking action to improve uptake of immunisations in Traveller families and reduce the persistent inequalities in coverage. TRIAL REGISTRATION: Current Controlled Trials ISRCTN20019630 .

Jit, M., M. Brisson, J. F. Laprise and Y. H. Choi (2015). "**Comparison of two dose and three dose human papillomavirus vaccine schedules: cost effectiveness analysis based on transmission model**." Bmj **350**: g7584.

OBJECTIVE: To investigate the incremental cost effectiveness of two dose human papillomavirus vaccination and of additionally giving a third dose. DESIGN: Cost effectiveness study based on a transmission dynamic model of human papillomavirus vaccination. Two dose schedules for bivalent or quadrivalent human papillomavirus vaccines were assumed to provide 10, 20, or 30 years' vaccine type protection and cross protection or lifelong vaccine type protection without cross protection. Three dose schedules were assumed to give lifelong vaccine type and cross protection. SETTING: United Kingdom. POPULATION: Males and females aged 12-74 years. INTERVENTIONS: No, two, or three doses of human papillomavirus vaccine given routinely to 12 year old girls, with an initial catch-up campaign to 18 years. MAIN OUTCOME MEASURE: Costs (from the healthcare provider's perspective), health related utilities, and incremental cost effectiveness ratios. RESULTS: Giving at least two doses of vaccine seems to be highly cost effective across the entire range of scenarios considered at the quadrivalent vaccine list price of pound86.50 (euro109.23; $136.00) per dose. If two doses give only 10 years' protection but adding a third dose extends this to lifetime protection, then the third dose also seems to be cost effective at pound86.50 per dose (median incremental cost effectiveness ratio pound17,000, interquartile range pound11,700- pound25,800). If two doses protect for more than 20 years, then the third dose will have to be priced substantially lower (median threshold price pound31, interquartile range pound28- pound35) to be cost effective. Results are similar for a bivalent vaccine priced at pound80.50 per dose and when the same scenarios are explored by parameterising a Canadian model (HPV-ADVISE) with economic data from the United Kingdom. CONCLUSIONS: Two dose human papillomavirus vaccine schedules are likely to be the most cost effective option provided protection lasts for at least 20 years. As the precise duration of two dose schedules may not be known for decades, cohorts given two doses should be closely monitored.

Jit, M., M. Brisson, A. Portnoy and R. Hutubessy (2014). "**Cost-effectiveness of female human papillomavirus vaccination in 179 countries: a PRIME modelling study**." Lancet Glob Health **2**(7): e406-414.

BACKGROUND: Introduction of human papillomavirus (HPV) vaccination in settings with the highest burden of HPV is not universal, partly because of the absence of quantitative estimates of country-specific effects on health and economic costs. We aimed to develop and validate a simple generic model of such effects that could be used and understood in a range of settings with little external support. METHODS: We developed the Papillomavirus Rapid Interface for Modelling and Economics (PRIME) model to assess cost-effectiveness and health effects of vaccination of girls against HPV before sexual debut in terms of burden of cervical cancer and mortality. PRIME models incidence according to proposed vaccine efficacy against HPV 16/18, vaccine coverage, cervical cancer incidence and mortality, and HPV type distribution. It assumes lifelong vaccine protection and no changes to other screening programmes or vaccine uptake. We validated PRIME against existing reports of HPV vaccination cost-effectiveness, projected outcomes for 179 countries (assuming full vaccination of 12-year-old girls), and outcomes for 71 phase 2 GAVI-eligible countries (using vaccine uptake data from the GAVI Alliance). We assessed differences between countries in terms of cost-effectiveness and health effects. FINDINGS: In validation, PRIME reproduced cost-effectiveness conclusions for 24 of 26 countries from 17 published studies, and for all 72 countries in a published study of GAVI-eligible countries. Vaccination of a cohort of 58 million 12-year-old girls in 179 countries prevented 690,000 cases of cervical cancer and 420,000 deaths during their lifetime (mostly in low-income or middle-income countries), at a net cost of US$4 billion. HPV vaccination was very cost effective (with every disability-adjusted life-year averted costing less than the gross domestic product per head) in 156 (87%) of 179 countries. Introduction of the vaccine in countries without national HPV vaccination at present would prevent substantially more cases of cervical cancer than in countries with such programmes, although the disparity has narrowed since 2012. If 71 phase 2 GAVI-eligible countries adopt vaccination according to forecasts, then in 2070 GAVI Alliance-funded vaccination could prevent 200,000 cases of cervical cancer and 100,000 deaths in some of the highest-burden countries. INTERPRETATION: Large between-country disparities exist for HPV vaccination, with countries with the most to gain yet to introduce national HPV vaccination. Support from the GAVI Alliance could help to reduce such disparities, but a substantial burden will remain even after presently projected vaccine introductions. FUNDING: WHO.

Kavanagh, K., K. G. Pollock, K. Cuschieri, T. Palmer, R. L. Cameron, C. Watt, R. Bhatia, C. Moore, H. Cubie, M. Cruickshank and C. Robertson (2017). "**Changes in the prevalence of human papillomavirus following a national bivalent human papillomavirus vaccination programme in Scotland: a 7-year cross-sectional study**." Lancet Infect Dis.

BACKGROUND: On Sept 1, 2008, Scotland launched routine vaccination for human papillomavirus (HPV) types 16 and 18, targeted at 12-13-year-old girls, of whom 92.4% were fully vaccinated in 2008-09. In this study, we report on vaccine effectiveness of the bivalent vaccine in these vaccinated women who attended for routine cervical screening at age 20-21 years. METHODS: In this 7-year cross-sectional study (covering birth cohorts 1988-1995), we sampled approximately 1000 samples per year from those attending cervical screening at age 20-21 years and tested each for HPV. By linkage to vaccination records we ascertained prevalence by birth cohort and vaccination status. Estimates of vaccine effectiveness for HPV types 16 and 18, HPV types 31, 33, and 45, other high-risk types, and any HPV were calculated using logistic regression. FINDINGS: In total, 8584 samples were HPV genotyped. Prevalence of HPV types 16 and 18 reduced substantially from 30.0% (95% CI 26.9-33.1) in the 1988 cohort to 4.5% (3.5-5.7) in the 1995 cohort, giving a vaccine effectiveness of 89.1% (85.1-92.3) for those vaccinated at age 12-13 years. All cross-protective types showed significant vaccine

effectiveness (HPV type 31, 93.8% [95% CI 83.8-98.5]; HPV type 33, 79.1% [64.2-89.0]; HPV type 45, 82.6% [61.5-93.9]). Unvaccinated individuals born in 1995 had a reduced odds of HPV types 16 and 18 infection compared with those born in 1988 (adjusted odds ratio 0.13 [95% CI 0.06-0.28]) and reduced odds of HPV types 31, 33, and 45 (odds ratio 0.45 [0.23-0.89]). INTERPRETATION: Bivalent vaccination has led to a startling reduction in vaccine and cross-protective HPV types 7 years after vaccination. There is also evidence of herd protection against the vaccine-specific and cross-protective types in unvaccinated individuals born in 1995. These findings should be considered in cost-effectiveness models informing vaccine choice and models to shape the future of cervical screening programmes. FUNDING: Scottish Government and Chief Scientists Office.

Kavanagh, K., K. G. Pollock, A. Potts, J. Love, K. Cuschieri, H. Cubie, C. Robertson and M. Donaghy (2014). "**Introduction and sustained high coverage of the HPV bivalent vaccine leads to a reduction in prevalence of HPV 16/18 and closely related HPV types**." Br J Cancer **110**(11): 2804-2811.

BACKGROUND: In 2008, a national human papillomavirus (HPV) immunisation programme began in Scotland for 12-13 year old females with a three-year catch-up campaign for those under the age of 18. Since 2008, three-dose uptake of bivalent vaccine in the routine cohort aged 12-13 has exceeded 90% annually, while in the catch-up cohort overall uptake is 66%. METHODS: To monitor the impact of HPV immunisation, a programme of national surveillance was established (pre and post introduction) which included yearly sampling and HPV genotyping of women attending for cervical screening at age 20. By linking individual vaccination, screening and HPV testing records, we aim to determine the impact of the immunisation programme on circulating type-specific HPV infection particularly for four outcomes: (i) the vaccine types HPV 16 or 18 (ii) types considered to be associated with cross-protection: HPV 31, 33 or 45; (iii) all other high-risk types and (iv) any HPV. RESULTS: From a total of 4679 samples tested, we demonstrate that three doses (n=1100) of bivalent vaccine are associated with a significant reduction in prevalence of HPV 16 and 18 from 29.8% (95% confidence interval 28.3, 31.3%) to 13.6% (95% confidence interval 11.7, 15.8%). The data also suggest cross-protection against HPV 31, 33 and 45. HPV 51 and 56 emerged as the most prevalent (10.5% and 9.6%, respectively) non-vaccine high-risk types in those vaccinated, but at lower rates than HPV 16 (25.9%) in those unvaccinated. CONCLUSIONS: This data demonstrate the positive impact of bivalent vaccination on the prevalence of HPV 16, 18, 31, 33 and 45 in the target population and is encouraging for countries which have achieved high-vaccine uptake.

Kavanagh, K., K. Sinka, K. Cuschieri, J. Love, A. Potts, K. G. Pollock, H. Cubie, M. Donaghy and C. Robertson (2013). "**Estimation of HPV prevalence in young women in Scotland; monitoring of future vaccine impact**." BMC Infect Dis **13**: 519.

BACKGROUND: Estimation of pre-immunisation prevalence of HPV and distribution of HPV types is fundamental to understanding the subsequent impact of HPV vaccination. We describe the type specific prevalence of HPV in females aged 20-21 in Scotland who attended or defaulted from cervical screening using three specimen types; from attenders liquid based cytology and from defaulters urine or self-taken swabs. METHODS: Residual liquid based cytology samples (n = 2148), collected from women aged 20-21 attending for their first smear were genotyped for HPV. A sample (n = 709) from women who had defaulted from screening was also made available for HPV testing through the use of postal testing kits (either urine samples (n = 378) or self-taken swabs (n = 331)). Estimates of prevalence weighted by deprivation, and for the postal testing kit, also by reminder status and specimen type were calculated for each HPV type. The

distribution of HPV types were compared between specimen types and the occurrence of multiple high-risk infections examined. The influence of demographic factors on high-risk HPV positivity and multiple infections was examined via logistic regression. RESULTS: The prevalence of any HPV in young women aged 20-21 was 32.2% for urine, 39.5% for self-taken swab, and 49.4% for LBC specimens. Infection with vaccine specific types (HPV 16, 18) or those associated with cross-protection (HPV 31, 33, 45, 51) was common. Individuals were more likely to test positive for high-risk HPV if they resided in an area of high deprivation or in a rural area. The overall distribution of HPV types did not vary between defaulters and attenders. Multiple infections occurred in 48.1% of high-risk HPV positive individuals. Excluding vaccine types the most common pairing was HPV 56 and 66. CONCLUSIONS: Understanding of the pre-immunisation prevalence of HPV in young women puts Scotland in a prime position to assess the early effect of vaccination as the first highly vaccinated cohorts of individuals enter the screening programme. Differences in results with different specimen types must be taken into account when monitoring the impact of vaccination programmes.

Kelly, D. (2014). "**Editorial: HPV vaccination: preventing more cancers in future generations**." J Clin Nurs **23**(7-8): 909-910.

Kennedy, C., C. Gray Brunton and R. Hogg (2014). "**'Just that little bit of doubt': Scottish parents', teenage girls' and health professionals' views of the MMR, H1N1 and HPV vaccines**." Int J Behav Med **21**(1): 3-10.

BACKGROUND: Parental decision making about childhood vaccinations is complex and the vaccination schedule ever-changing. Vaccination may be controversial even in countries with historically high vaccination rates such as Scotland. Health behaviour models have aided understanding of individual vaccine intentions for specific vaccines. These are limited in explaining actual behaviours and are divorced from the impact of socio-cultural contexts on vaccination decision making. PURPOSE: To explore vaccination views in Scotland amongst parents, teenage girls and health professionals across three controversial vaccines: the Measles, Mumps, Rubella (MMR), the Human Papilloma virus (HPV) and the Influenza A (H1N1) vaccine. METHOD: We used qualitative interviews and focus group discussions in a purposive sample of health professionals (n = 51), parents (n = 15) and teenage girls aged 12-15 years (n = 8) about their views of these vaccines. Discussions were analysed using thematic analysis. RESULTS: Two main themes are highlighted: 'vaccine risks revisited' in which we explored how the MMR legacy resurfaced and how worries about vaccine safety permeated the data. 'Vaccine responsibilities' indicated tensions regarding roles and responsibilities for vaccines. An overarching notion of 'just that little bit of doubt' referred to lingering doubts and uncertainties interwoven across the vaccines. CONCLUSIONS: Public health authorities should remain alert towards pervasive vaccine concerns. It is important for authorities to clarify vaccine roles and responsibilities in the face of new and existing vaccines and to acknowledge public concerns regarding vaccine safety.

Kirby, T. (2015). "**UK committee recommends HPV vaccination for MSM**." Lancet Oncol **16**(1): e7.

Leeson, S., N. Stuart, Y. Sylvestre, L. Hall and R. Whitaker (2013). "**Gynaecological cancer follow-up: national survey of current practice in the UK**." BMJ Open **3**(7).

OBJECTIVE: To establish a baseline of national practice for follow-up after treatment for gynaecological cancer. DESIGN: Questionnaire survey. SETTING: Gynaecological cancer centres and units. GEOGRAPHICAL LOCATION UK PARTICIPANTS: Members of the British Gynaecological

Cancer Society and the National Forum of Gynaecological Oncology Nurses. INTERVENTIONS: A questionnaire survey. OUTCOME MEASURES: To determine schedules of follow-up, who provides it and what routine testing is used for patients who have had previous gynaecological cancer. RESULTS: A total of 117 responses were obtained; 115 (98%) reported hospital scheduled regular follow-up appointments. Two involved general practitioners. Follow-up was augmented or replaced by telephone follow-up in 29 responses (25%) and patient-initiated appointments in 38 responses (32%). A total of 80 (68%) cancer specialists also offered combined follow-up clinics with other specialties. Clinical examinations for hospital-based follow-up were mainly performed by doctors (67% for scheduled regular appointments and 63% for patient-initiated appointments) while telephone follow-up was provided in the majority by nurses (76%). Most respondents (76/117 (65%)) provided routine tests, of which 66/76 (87%) reported carrying out surveillance tests for ovarian cancer, 35/76 (46%) for cervical cancer, 8/76 (11%) for vulval cancer and 7/76 (9%) for endometrial cancer. Patients were usually discharged after 5 years (82/117 (70%)), whereas three (3%) were discharged after 4 years, nine (8%) after three years and one (1%) after 2 years. CONCLUSIONS: Practice varied but most used a standard hospital-based protocol of appointments for 5 years and routine tests were performed usually for women with ovarian cancer. A minority utilised nurse-led or telephone follow-up. General practitioners were rarely involved in routine care. A randomised study comparing various models of follow-up could be considered.

Lin, A., K. J. Ong, P. Hobbelen, E. King, D. Mesher, W. J. Edmunds, P. Sonnenberg, R. Gilson, I. Bains, Y. H. Choi, C. Tanton, K. Soldan and M. Jit (2017). "**Impact and Cost-effectiveness of Selective Human Papillomavirus Vaccination of Men Who Have Sex With Men**." Clin Infect Dis **64**(5): 580-588.

Background: Men who have sex with men (MSM) have a high lifetime risk of anogenital warts and cancers related to infection with human papillomavirus (HPV). They also benefit less from herd protection than heterosexual males in settings with female-only HPV vaccination. Methods: We evaluated the potential health impact and cost-effectiveness of offering vaccination to MSM who visit genitourinary medicine (GUM) clinics. We used a mathematical model of HPV 6/11/16/18 sexual transmission within an MSM population in England, parameterized with sexual behaviour, GUM attendance, HPV prevalence, HIV prevalence, warts, and cancer incidence data. Interventions considered were offering HPV vaccination to either HIV-positive MSM or MSM regardless of HIV status, for age bands 16-25, 16-30, 16-35, and 16-40 years. Results: Substantial declines in anogenital warts and male HPV-related cancer incidence are projected to occur following an offer of vaccination to MSM. MSM not attending GUM clinics will partially benefit from herd protection. Offering vaccination to HIV-positive MSM up to age 40 is likely to be cost-effective if vaccine procurement and administration costs are below pound96.50 a dose. At pound48 a dose, offering vaccination to all MSM up to age 40 is likely to be cost-effective. Conclusions: Quadrivalent HPV vaccination of MSM via GUM clinics is likely to be an effective and cost-effective way of reducing the burden of HPV-related disease in MSM.

Mantzari, E., F. Vogt and T. M. Marteau (2015). "**Financial incentives for increasing uptake of HPV vaccinations: a randomized controlled trial**." Health Psychol **34**(2): 160-171.

OBJECTIVE: Uptake of human papillomavirus (HPV) vaccinations by 17- to 18-year-old girls in England is below (<35%) target (80%). This trial assesses (a) the impact of financial incentives on uptake and completion of an HPV vaccination program, and (b) whether impacts are moderated by participants' deprivation level. It also assesses the impact of incentives on decision quality to

get vaccinated, as measured by attitudes toward the vaccination and knowledge of its consequences. METHOD: One thousand 16- to 18-year-old girls were invited to participate in an HPV vaccination program: 500 previously uninvited, and 500 unresponsive to previous invitations. Girls randomly received either a standard invitation letter or a letter including the offer of vouchers worth pound 45 (euro 56; $73) for undergoing 3 vaccinations. Girls attending their first vaccination appointment completed a questionnaire assessing decision quality to be vaccinated. Outcomes were uptake of the first and third vaccinations and decision quality. RESULTS: The intervention increased uptake of the first (first-time invitees: 28.4% vs. 19.6%, odds ratio [OR] = 1.63, 95% confidence interval [CI; 1.08, 2.47]; previous nonattenders: 23.6% vs. 10.4%, OR = 2.65, 95% CI [1.61, 4.38]) and third (first-time invitees: 22.4% vs. 12%, OR = 2.15, 95% CI [1.32, 3.50]; previous nonattenders: 12.4% vs. 3%, OR = 4.28, 95% CI [1.92, 9.55]) vaccinations. Impacts were not moderated by deprivation level. Decision quality was unaffected by the intervention. CONCLUSIONS: Although the intervention increased completion of HPV vaccinations, uptake remained lower than the national target, which, in addition to cost effectiveness and acceptability issues, necessitates consideration of other ways of achieving it.

Marlow, L. and J. Waller (2017). "**The changing landscape of cervical screening-What does the future hold for primary care?**" Eur J Cancer Care (Engl) **26**(3).

The landscape of cervical cancer prevention is changing in many countries thanks to the introduction of vaccination against high-risk types of human papillomavirus (HPV) and the incorporation of HPV DNA testing into cervical screening algorithms. In addition to this, uptake of screening is falling year on year in the UK and elsewhere. These factors present challenges and opportunities for health professionals working in primary care-in terms of communicating programmatic changes to women; responding to questions about the meaning and implications of HPV test results; and delivering interventions to increase screening uptake.

Marlow, L. A., G. D. Zimet, K. J. McCaffery, R. Ostini and J. Waller (2013). "**Knowledge of human papillomavirus (HPV) and HPV vaccination: an international comparison**." Vaccine **31**(5): 763-769.

Since vaccination against human papillomavirus (HPV) became available, awareness of HPV has dramatically increased. Implementation of a vaccine program varies internationally yet no studies have explored the influence this has on the public's knowledge of HPV. The present study aimed to explore differences in awareness of HPV and HPV knowledge across three countries: The US, UK and Australia. Participants (n=2409) completed a validated measure of HPV knowledge as part of an online survey. There were higher levels of HPV awareness among men and women in the US than the UK and Australia. Being male and having a lower educational level was associated with lower HPV awareness in all three countries. Awareness of HPV vaccine was higher in women from the US than the UK and Australia. Women in the US scored significantly higher on general HPV knowledge (on a 15-item scale) than women in the UK and Australia, but there were no between country differences in HPV vaccine knowledge (on a 6-item scale). When asked about country-specific vaccine availability, participants in the US were less able to identify the correct answers than participants in the UK and Australia. More than half of participants did not know: HPV can cause genital warts; most sexually active people will get HPV at some point in their life; or HPV doesn't usually need treatment. Pharmaceutical advertising campaigns could explain why awareness of HPV and HPV vaccine is higher in the US and this has helped to get some important messages across. Significant gaps in HPV knowledge remain across all three countries.

Masterson, L. and M. Lechner (2016). "**Health policy: HPV vaccination in boys - will the UK join the fight?**" Nat Rev Clin Oncol **13**(12): 721-722.

Masterson, L. and M. Lechner (2016). "**HPV vaccination in boys - will the UK join the fight?**" Nature Reviews Clinical Oncology **13**(12): 721-U783.

The UK Joint Committee on Vaccination and Immunization recently announced a further delay before considering the subject of widespread human papillomavirus (HPV) vaccination in teenage boys, thereby excluding an estimated 2.9 million boys from receiving an effective treatment in this interim period. Vaccination of boys can offer significant clinical, economic and ethical advantages.

Masterson, L., J. O'Mahony and M. Lechner (2016). "**Expanding the benefits of HPV vaccination to boys and men**." Lancet **388**(10063): 2992.

McCusker, S. M., I. Macqueen, G. Lough, A. I. Macdonald, C. Campbell and S. V. Graham (2013). "**Gaps in detailed knowledge of human papillomavirus (HPV) and the HPV vaccine among medical students in Scotland**." BMC Public Health **13**: 264.

BACKGROUND: A vaccination programme targeted against human papillomavirus (HPV) types 16 and 18 was introduced in the UK in 2008, with the aim of decreasing incidence of cervical disease. Vaccine roll out to 12-13 year old girls with a catch-up programme for girls aged up to 17 years and 364 days was accompanied by a very comprehensive public health information (PHI) campaign which described the role of HPV in the development of cervical cancer. METHODS: A brief questionnaire, designed to assess acquisition of knowledge of HPV infection and its association to cervical cancer, was administered to two different cohorts of male and female 1st year medical students (school leavers: 83% in age range 17-20) at a UK university. The study was timed so that the first survey in 2008 immediately followed a summer's intensive PHI campaign and very shortly after vaccine roll-out (150 students). The second survey was exactly one year later over which time there was a sustained PHI campaign (213 students). RESULTS: We addressed three research questions: knowledge about three specific details of HPV infection that could be acquired from PHI, whether length of the PHI campaign and/or vaccination of females had any bearing on HPV knowledge, and knowledge differences between men and women regarding HPV. No female student in the 2008 cohort had completed the three-dose vaccine schedule compared to 58.4% of female students in 2009. Overall, participants' knowledge regarding the sexually transmitted nature of HPV and its association with cervical cancer was high in both year groups. However, in both years, less than 50% of students correctly identified that HPV causes over 90% of cases of cervical cancer. Males gave fewer correct answers for these two details in 2009. In 2008 only around 50% of students recognised that the current vaccine protects against a limited subset of cervical cancer-causing HPV sub-types, although there was a significant increase in correct response among female students in the 2009 cohort compared to the 2008 cohort. CONCLUSIONS: This study highlights a lack of understanding regarding the extent of protection against cervical cancer conferred by the HPV vaccine, even among an educated population in the UK who could have a vested interest in acquiring such knowledge. The intensive PHI campaign accompanying the first year of HPV vaccination seemed to have little effect on knowledge over time. This is one of the first studies to assess detailed knowledge of HPV in both males and females. There is scope for continued improvements to PHI regarding the link between HPV infection and cervical cancer.

McSherry, L. A., S. U. Dombrowski, J. J. Francis, J. Murphy, C. M. Martin, J. J. O'Leary and L. Sharp (2012). "**'It's a can of worms': understanding primary care practitioners' behaviours in relation to HPV using the Theoretical Domains Framework**." Implement Sci **7**: 73.

BACKGROUND: The relationship between infection with high-risk human papillomavirus (HPV) and cervical cancer is transforming cervical cancer prevention. HPV tests and vaccinations have recently become available. In Ireland, as elsewhere, primary care practitioners play a key role in prevention. ATHENS (A Trial of HPV Education and Support) aims to develop a theory-based intervention to support primary care practitioners in their HPV-related practice. This study, the first step in the intervention development process, aimed to: identify HPV-related clinical behaviours that the intervention will target; clarify general practitioners' (GPs') and practice nurses' roles and responsibilities; and determine factors that potentially influence clinical behaviour. A secondary objective was to informally assess the utility of the Theoretical Domains Framework (TDF) in understanding clinical behaviours in an area with an evolving evidence-base. METHODS: In-depth semi-structured telephone interviews were conducted with GPs and practice nurses. The topic guide, which contained open questions and HPV-related clinical scenarios, was developed through literature review and clinical experience. Interview transcripts were content-analysed using the TDF as the coding framework. RESULTS: 19 GPs and 14 practice nurses were interviewed. The major HPV-related clinical behaviours were: initiating a discussion about HPV infection with female patients; offering/recommending HPV vaccination to appropriate patients; and answering patients' questions about HPV testing. While the responsibility for taking smears was considered a female role, both male and female practitioners dealt with HPV-related issues. All 12 theoretical domains arose in relation to HPV infection; the domains judged to be most important were: knowledge, emotion, social influences, beliefs about capabilities and beliefs about consequences. Eleven domains emerged in relation to HPV vaccination, with beliefs about consequences, social influences, knowledge and environmental context and resources judged to be the most important. Nine domains were relevant to HPV testing, with knowledge and beliefs about capabilities judged to be the most important. CONCLUSIONS: The findings confirm the need for an intervention to support primary care practitioners around HPV and suggest it should target a range of theoretical domains. The TDF proved valuable in analysing qualitative data collected using a topic guide not specifically designed to capture TDF domains and understanding clinical behaviours in an area with an evolving evidence-base.

Mesher, D., K. Panwar, S. L. Thomas, S. Beddows and K. Soldan (2016). "**Continuing reductions in HPV 16/18 in a population with high coverage of bivalent HPV vaccination in England: an ongoing cross-sectional study**." BMJ Open **6**(2): e009915.

OBJECTIVES: The human papillomavirus (HPV) immunisation programme in England was introduced in 2008. Monitoring changes in type-specific HPV prevalence allows assessment of the population impact of this vaccination programme. METHODS: Residual vulva-vaginal swab specimens were collected from young sexually active women (aged 16-24 years) attending for chlamydia screening across England. Specimens were collected between 2010 and 2013 for type-specific HPV-DNA testing. HPV prevalence was compared to a similar survey conducted in 2008 prior to the introduction of HPV vaccination. RESULTS: A total of 7321 specimens collected in the postvaccination period, and 2354 specimens from the prevaccination period were included in this analysis. Among the individuals aged 16-18 years, with an estimated vaccination coverage of 67%, the prevalence of HPV16/18 infection decreased from 17.6% in 2008 to 6.1% in the postvaccination period. Within the postvaccination period, there was a trend towards

lower HPV16/18 prevalence with higher vaccination coverage and increasing time since vaccine introduction from 8.5% in the period 2-3 years postvaccination to 4.0% in the period 4-5 years postvaccination. The prevalence of HPV31 reduced from 3.7% in the prevaccination period to 0.9% after vaccine introduction, although this no longer reached statistical significance after additional consideration of the uncertainty due to the assay change. Smaller reductions were seen in the individuals aged 19-21 years with lower estimated vaccination coverage, but there was no evidence of a reduction in the older unvaccinated women. Some overall increase in non-vaccine types was seen in the youngest age groups (ORs (95% CI); 1.3 (1.0 to 1.7) and 1.5 (1.1 to 2.0) for individuals aged 16-18 and 19-21 years, respectively, when adjusted for known population changes and the change in assay) although this should be interpreted with caution given the potential unmasking effect. CONCLUSIONS: These data demonstrate a reduction in the HPV vaccine types in the age group with the highest HPV vaccination coverage.

Mesher, D., K. Soldan, R. Howell-Jones, K. Panwar, P. Manyenga, M. Jit, S. Beddows and O. N. Gill (2013). "**Reduction in HPV 16/18 prevalence in sexually active young women following the introduction of HPV immunisation in England**." Vaccine **32**(1): 26-32.

BACKGROUND: Reduction in the prevalence of vaccine type HPV infection in young women is an early indication of the impact of the HPV immunisation programme and a necessary outcome if the subsequent impact on cervical cancer is to be realised. METHODS: Residual vulva-vaginal swab (VVS) specimens from young women aged 16-24 years undergoing chlamydia screening in community sexual health services (formerly known as family planning clinics), general practice (GP), and youth clinics in 2010-2012 were submitted from 10 laboratories in seven regions around England. These specimens were linked to demographic and sexual behaviour data reported with the chlamydia test, anonymised, and tested for type-specific HPV DNA using a multiplex PCR and Luminex-based genotyping test. Estimated immunisation coverage was calculated and findings were compared to a baseline survey conducted prior to the introduction of HPV immunisation in 2008. RESULTS: A total of 4664 eligible specimens were collected and 4178 had a valid test result. The post-immunisation prevalence of HPV 16/18 infection was lowest in this youngest age group (16-18 years) and increased with age. This increase with age was a reversal of the pattern seen prior to immunisation and was inversely associated with estimates of age-specific immunisation coverage (65% for 16-18 year olds). The prevalence of HPV 16/18 infection in the post-immunisation survey was 6.5% amongst 16-18 year olds, compared to 19.1% in the similar survey conducted prior to the introduction of HPV immunisation. CONCLUSIONS: These findings are the first indication that the national HPV immunisation programme is successfully preventing HPV 16/18 infection in sexually active young women in England. The reductions seen suggest, for the estimated coverage, high vaccine effectiveness and some herd-protection benefits. Continued surveillance is needed to determine the effects of immunisation on non-vaccine HPV types.

Mesher, D., E. Stanford, J. White, J. Findlow, R. Warrington, S. Das, R. Pebody, R. Borrow and K. Soldan (2016). "**HPV Serology Testing Confirms High HPV Immunisation Coverage in England**." PLoS One **11**(3): e0150107.

BACKGROUND: Reported human papillomavirus (HPV) vaccination coverage in England is high, particularly in girls offered routine immunisation at age 12 years. Serological surveillance can be used to validate reported coverage and explore variations within it and changes in serological markers over time. METHODS: Residual serum specimens collected from females aged 15-19 years in 2010-2011 were tested for anti-HPV16 and HPV18 IgG by ELISA. Based on these results,

females were classified as follows: seronegative, probable natural infection, probable vaccine-induced seropositivity, or possible natural infection/possible vaccine-induced seropositivity. The proportion of females with vaccine-induced seropositivity was compared to the reported vaccination coverage. RESULTS: Of 2146 specimens tested, 1380 (64%) were seropositive for both types HPV16 and HPV18 and 159 (7.4%) positive for only one HPV type. The IgG concentrations were far higher for those positive for both HPV types than those positive for only one HPV type. 1320 (62%) females were considered to have probable vaccine-induced seropositivity. Among vaccine-induced seropositives, antibody concentrations declined with increasing age at vaccination and increasing time since vaccination. CONCLUSIONS: The proportion of females with vaccine-induced seropositivity was closest to the reported 3-dose coverage in those offered the vaccination at younger ages, with a greater discrepancy in the older females. This suggests either some under-reporting of immunisations of older females and/or that partial vaccination (i.e. one- or two-doses) has provided high antibody responses in 13-17 year olds.

Mitchell, D., R. Audisio, G. Cruickshank, S. Cannon, T. Gill, A. Hayes, S. Kehoe, J. McGuigan, B. Powell, N. Price, N. Roland, L. Wyld and C. Canc Serv (2014). "**HPV VACCINATION Boys in the UK should be offered vaccination against human papillomavirus (HPV)**." Bmj-British Medical Journal **348**.

Mupandawana, E. T. and R. Cross (2016). "**Attitudes towards human papillomavirus vaccination among African parents in a city in the north of England: a qualitative study**." Reprod Health **13**(1): 97.
BACKGROUND: Human papillomavirus (HPV) is sexually transmitted and has been conclusively linked to cervical cancer and genital warts. Cervical cancer is attributed to approximately 1100 deaths annually in UK, and is the second most common female cancer globally. It has been suggested that black African women are more predisposed to HPV infection and cervical cancer. A vaccine has been developed to reduce HPV infection, and in the UK, has been offered to 12-13 year old adolescent girls through schools as part of their childhood immunization programme since 2008. Upon programme initiation, it was noted that vaccine uptake was lower in schools where girls from ethnic minority groups were proportionately higher. The study's objectives were to explore factors influencing UK based African parents' acceptance or decline of the HPV vaccine, whether fathers and mothers share similar views pertaining to vaccination and any interfamily tensions resulting from differing views. METHODS: A qualitative study was conducted with five African couples residing in north England. Face to face semi-structured interviews were carried out. Participants were parents to at least one daughter aged between 8 and 14 years. Recruitment was done through purposive sampling using snowballing. RESULTS: HPV and cervical cancer awareness was generally low, with awareness lower in fathers. HPV vaccination was generally unacceptable among the participants, with fear of promiscuity, infertility and concerns that it's still a new vaccine with yet unknown side effects cited as reasons for vaccine decline. There was HPV risk denial as religion and good cultural upbringing seemed to result in low risk perceptions, with HPV and cervical cancer generally perceived as a white person's disease. Religious values and cultural norms influenced vaccine decision-making, with fathers acting as the ultimate decision makers. Current information about why the vaccine is necessary was generally misunderstood. CONCLUSION: Tailored information addressing religious and cultural concerns may improve vaccine acceptability in African parents.

Nadarzynski, T., C. Llewellyn, D. Richardson, A. Pollard and H. Smith (2015). "**A QUALITATIVE ASSESSMENT OF UK SEXUAL HEALTHCARE PROFESSIONALS' VIEWS ON TARGETED VACCINATION AGAINST HUMAN PAPILLOMAVIRUS (HPV) FOR MEN WHO HAVE SEX WITH MEN (MSM)**." Sex Transm Infect **91**: A54-A54.

Nadarzynski, T., C. Llewellyn, D. Richardson, A. Pollard and H. Smith (2017). "**UK healthcare professionals**." Sex Health.

Background: Female-only human papillomavirus (HPV) vaccination will fail to protect men who have sex with men (MSM) against HPV and its sequelae (i.e. genital warts and anal cancers). In the absence of gender-neutral HPV vaccination, targeted vaccination at sexual health clinics for MSM offers a valuable preventive opportunity. This study aimed to identify sexual healthcare professionals' (HCPs) perceived barriers and facilitators for MSM-targeted HPV vaccination. Methods: Nineteen telephone interviews with UK-based self-referred HCPs (13 doctors, three nurses, three health advisers) were conducted in October and November 2014. The interviews were recorded and transcribed verbatim. Data were analysed thematically by two researchers. Results: HCPs were unsure about selection criteria, acceptable healthcare settings and the source of vaccination funding for the introduction of MSM-targeted HPV vaccination. Lack of political and public support, MSMs' limited access to HPV vaccination and disclosure of sexual orientation to HCPs, identification of eligible MSM, patients' poor HPV awareness and motivation to complete HPV vaccination were perceived as significant barriers. HCPs believed that the introduction of official guidelines on HPV vaccination for MSM, awareness campaigns and integrated clinic procedures could improve vaccination coverage. Conclusion: HCPs recognised a need to protect MSM against HPV. However, several challenges and obstacles associated with the introduction of MSM-targeted HPV vaccination in the UK were reported. HCPs' perspectives and concerns need to be addressed when developing policies and guidelines for a potential MSM-targeted HPV vaccination. Future research needs to examine whether negative views of HCPs towards MSM-targeted HPV vaccination are associated with lower HPV vaccine uptake and completion rates in MSM.

Nadarzynski, T., H. Smith, D. Richardson, A. Pollard and C. Llewellyn (2017). "**Perceptions of HPV and attitudes towards HPV vaccination amongst men who have sex with men: A qualitative analysis**." Br J Health Psychol **22**(2): 345-361.

OBJECTIVES: Men who have sex with men (MSM) are at risk of genital warts and anal cancer due to human papillomavirus (HPV) infection. This study explores MSMs' perceptions of HPV and HPV vaccination prior to the introduction of this programme. DESIGN: Focus groups and one-to-one interviews with self-identified MSM were conducted between November 2014 and March 2015 in Brighton, UK. METHODS: Participants were recruited from community-based lesbian-gay-bisexual-transgender (LGBT) venues and organizations. Discussions were recorded, transcribed verbatim, and analysed using framework analysis. RESULTS: Thirty-three men took part (median age 25 years, IQR: 21-27), most of whom (n = 25) did not know about HPV, anal cancer (31), or HPV vaccination (26). While genital warts and anal cancer were perceived as severe, men did not perceive themselves at risk of HPV. All MSM would accept the HPV vaccine if offered by a health care professional. The challenges of accessing sexual health services or openly discussing same-sex experiences with health care professionals were perceived as barriers to accessing HPV vaccination. Two participants were concerned that selective HPV vaccination could increase stigma and prejudice against MSM, comparable to the AIDS epidemic. Ten MSM were unsure about the effectiveness of HPV vaccination for sexually active

men and were in favour of vaccinating all adolescent boys at school. CONCLUSIONS: Most MSM have poor knowledge about HPV and associated anal cancer. Despite the lack of concern about HPV, most MSM expressed willingness to receive HPV vaccination. There is a need for health education about the risks of HPV and HPV-related diseases so that MSM can appraise the benefits of being vaccinated. Concerns about HPV vaccine effectiveness in sexually active men and possible stigmatization need to be addressed to optimize HPV vaccine acceptability. Statement of contribution What is already known on this subject? Men who have sex with men (MSM) have poor knowledge about HPV and HPV-related diseases. Perceived risk of HPV and attitudes towards HPV vaccination are associated with HPV vaccine acceptability amongst MSM in the United States. There is a gap between acceptability and uptake of HPV vaccination amongst MSM. What does this study add? Due to concerns about compromised effectiveness of the HPV vaccine in sexually active men, most MSM would recommend vaccination of all adolescent boys. Restricted access to sexual health services and the inability to discuss same-sex experiences were perceived as barriers to HPV vaccination. While the HPV vaccine is acceptable amongst MSM, the motivation to be vaccinated and complete the three-dose series might be low.

Nadarzynski, T., H. E. Smith, D. Richardson, E. Ford and C. D. Llewellyn (2015). "**Sexual healthcare professionals' views on HPV vaccination for men in the UK**." Br J Cancer **113**(11): 1599-1601.

BACKGROUND: Human Papillomavirus (HPV) vaccination for men could prevent anal cancers amongst men who have sex with men (MSM). METHODS: An e-survey of attitudes towards vaccination for men in the UK was conducted in July-August 2014. RESULTS: Among 325 sexual health professionals, 14% were already vaccinating men against HPV, 83% recommended gender-neutral HPV vaccination and 65% recommended targeting MSM. Over 50% reported having poor knowledge about the use of HPV vaccine for MSM and the skills to identify MSM likely to benefit from HPV vaccination. CONCLUSIONS: Clear advice and guidelines on HPV vaccine use for men at sexual health clinics are required to ensure equitable opportunities for vaccination.

Overbeck-Zubrzycka, D., N. Liou, N. Raj, H. R. Babatolu and R. Beukenholdt (2015). "**Awareness of HPV virus in the North East of England following introduction of the HPV vaccine: a cross sectional study**." Bjog-an International Journal of Obstetrics and Gynaecology **122**: 24-24.

Palmer, J. E., P. Amarad, K. Ellis, N. Dudding, J. Smith and J. A. Tidy (2012). "**The outcome for women with microinvasive cervical cancer with stromal invasion 1 mm or less: should we always re-excise?**" Int J Gynecol Pathol **31**(5): 470-474.

To assess the management and outcome for women with microinvasive cervical cancer with stromal invasion 1 mm or less, examining the impact of re-excision. A retrospective cohort study with interval analysis performed between December 2000 and December 2010. Sheffield Gynaecological Cancer Centre and Jessop Wing Colposcopy Unit, Sheffield, UK. Women diagnosed with microinvasive cervical cancer with stromal invasion 1 mm or less during the allocated study period. Methods used is a retrospective cohort study. Risk of recurrence and mortality from disease; incidence of residual disease in repeat excision specimens. A total of 140 women were identified as having microinvasive cervical cancer with stromal invasion 1 mm or less. Sixty-three (45%) had a completely excised lesion; 77 (55%) had an incompletely excised lesion at first treatment. Fifty-five women underwent repeat excision. No residual disease was found in the majority (n=40; 73%). No women suffered disease recurrence or died from disease

during the allocated study period. Outcome for women with microinvasive cervical cancer with stromal invasion 1 mm or less is excellent. Repeat excision is associated with very low rates of residual disease. A more conservative approach to follow-up incorporating HPV testing should be explored.

Palmer, T. J., M. McFadden, K. G. Pollock, K. Kavanagh, K. Cuschieri, M. Cruickshank, S. Nicoll and C. Robertson (2016). "**HPV immunisation and increased uptake of cervical screening in Scottish women; observational study of routinely collected national data**." Br J Cancer **114**(5): 576-581.

BACKGROUND: To measure the uptake of first invitation to cervical screening by vaccine status in a population-based cohort offered HPV immunisation in a national catch-up campaign. METHODS: A retrospective observational study of routinely collected data from the Scottish Cervical Screening Programme. Data were extracted and linked from the Scottish Cervical Call Recall System, the Scottish Population Register and the Scottish Index of Multiple Deprivation. Records from 201 023 women born between 1 January 1988 and 30 September 1993 were assessed. Women born in or after 1990 were eligible for the national catch-up programme of HPV immunisation. Attendance for screening was within 12 months of the first invitation at age 20 years. RESULTS: There was a significant decline in overall attendance from the 1988 cohort to the 1993 cohort with the adjusted attendance ratio of the 1988 cohort being 1.49 times (95% CI 1.46-1.52) that of the 1993 cohort. Immunisation compensated for this decrease in uptake with unvaccinated individuals having a reduced ratio of attendance compared with those fully vaccinated (RR=0.65, 95% CI 0.64-0.65). Not taking up the opportunity for HPV immunisation was associated with an attendance for screening below the trend line for all women before the availability of HPV immunisation. CONCLUSIONS: HPV immunisation is not associated with the reduced attendance for screening that had been feared. Immunised women in the catch-up cohorts appear to be more motivated to attend than unimmunised women, but this may be a result of a greater awareness of health issues. These results, while reassuring, may not be reproduced in routinely immunised women. Continued monitoring of attendance for the first smear and subsequent routine smears is needed.

Patel, H., Y. B. Jeve, S. M. Sherman and E. L. Moss (2016). "**Knowledge of human papillomavirus and the human papillomavirus vaccine in European adolescents: a systematic review**." Sex Transm Infect **92**(6): 474-479.

BACKGROUND: The human papillomavirus (HPV) vaccine is recommended for adolescent girls in many European countries, however there is huge variation in vaccine uptake. METHODS: A mixed methods systematic review to ascertain the level of HPV and HPV vaccine knowledge that exists among European adolescents. Two electronic databases, Ovid Medline and PsychInfo, were searched from origin to September 2014. Meta-analysis was performed for the two primary outcome measures ('have you heard of HPV?' and 'have you heard of the HPV vaccine?'), assessing for the correlation between gender and knowledge. This was supplemented with meta-synthesis for the remaining associations and secondary outcomes. RESULTS: 18 papers were included in the final review. Overall European adolescents had poor understanding of basic HPV and HPV vaccine knowledge. Meta-analysis identified that female adolescents are more likely to have heard of HPV (n=2598/5028 girls versus n=1033/3464 boys; OR 2.73, 95% CI 1.86-3.99) and the HPV vaccine (n=1154/2556 girls versus n=392/2074 boys; OR 5.64, 95% CI 2.43-13.07), compared to males. Age, higher education and a positive vaccination status were also associated with increased awareness. There was limited appreciation of more detailed HPV knowledge and uncertainty existed regarding the level of protection offered by the

vaccine and the need for cervical screening post vaccination. CONCLUSIONS: The delivery of HPV education to European adolescents needs to be re-evaluated, since at present there appears to be significant deficiencies in their basic knowledge and understanding of the subject. Increasing HPV knowledge will empower adolescents to make informed choices regarding participation with HPV related cancer prevention health strategies.

Pollock, K. G., K. Kavanagh, A. Potts, J. Love, K. Cuschieri, H. Cubie, C. Robertson, M. Cruickshank, T. J. Palmer, S. Nicoll and M. Donaghy (2014). "**Reduction of low- and high-grade cervical abnormalities associated with high uptake of the HPV bivalent vaccine in Scotland**." Br J Cancer **111**(9): 1824-1830.
BACKGROUND: In Scotland, a national HPV immunisation programme began in 2008 for 12- to 13-year olds, with a catch-up campaign from 2008 to 2011 for those under the age of 18. To monitor the impact of HPV immunisation on cervical disease at the population level, a programme of national surveillance was established. METHODS: We analysed colposcopy data from a cohort of women born between 1988 and 1992 who entered the Scottish Cervical Screening Programme (SCSP) and were aged 20-21 in 2008-2012. RESULTS: By linking datasets from the SCSP and colposcopy services, we observed a significant reduction in diagnoses of cervical intraepithelial neoplasia 1 (CIN 1; RR 0.71, 95% CI 0.58 to 0.87; P=0.0008), CIN 2 (RR 0.5, 95% CI 0.4 to 0.63; P<0.0001) and CIN 3 (RR 0.45, 95% CI 0.35 to 0.58; P<0.0001) for women who received three doses of vaccine compared with unvaccinated women. CONCLUSIONS: To our knowledge, this is one of the first studies to show a reduction of low- and high-grade CIN associated with high uptake of the HPV bivalent vaccine at the population level. These data are very encouraging for countries that have achieved high HPV vaccine uptake.

Pollock, K. G. J., K. Kavanagh, A. Potts, J. Love, K. Cuschieri, H. Cubie, C. Robertson, M. Cruickshank, T. J. Palmer, S. Nicoll and M. Donaghy (2014). "**Reduction of low- and high-grade cervical abnormalities associated with high uptake of the HPV bivalent vaccine in Scotland**." Br J Cancer **111**(9): 1824-1830.
Background: In Scotland, a national HPV immunisation programme began in 2008 for 12- to 13-year olds, with a catch-up campaign from 2008 to 2011 for those under the age of 18. To monitor the impact of HPV immunisation on cervical disease at the population level, a programme of national surveillance was established. Methods: We analysed colposcopy data from a cohort of women born between 1988 and 1992 who entered the Scottish Cervical Screening Programme (SCSP) and were aged 20-21 in 2008-2012. Results: By linking datasets from the SCSP and colposcopy services, we observed a significant reduction in diagnoses of cervical intraepithelial neoplasia 1 (CIN 1; RR 0.71, 95% CI 0.58 to 0.87; P = 0.0008), CIN 2 (RR 0.5, 95% CI 0.4 to 0.63; P<0.0001) and CIN 3 (RR 0.45, 95% CI 0.35 to 0.58; P<0.0001) for women who received three doses of vaccine compared with unvaccinated women. Conclusions: To our knowledge, this is one of the first studies to show a reduction of low- and high-grade CIN associated with high uptake of the HPV bivalent vaccine at the population level. These data are very encouraging for countries that have achieved high HPV vaccine uptake.

Potts, A., K. Sinka, J. Love, R. Gordon, S. McLean, W. Malcolm, D. Ross and M. Donaghy (2013). "**High uptake of HPV immunisation in Scotland--perspectives on maximising uptake**." Euro Surveill **18**(39).
In September 2008, Scotland introduced a national human papillomavirus (HPV) immunisation programme with bivalent HPV vaccine, to prevent cervical cancer. This school-based programme routinely vaccinates girls aged between 12 and 13 years. A catch-up campaign, running over three years, also began at this time, offering vaccination to all girls aged 13 years to under 18 years old. The HPV immunisation campaign presented challenges due to this vaccine being

targeted to girls in school and older girls who had left school. Following a long and comprehensive planning process, this campaign was successfully implemented across Scotland, delivering high vaccine uptake of 91.4% for three doses of vaccine in the first year (September 2008 to August 2009) for the routine cohort and 90.1% in the second year (September 2009 to August 2010) for the routine cohort. We describe the planning process, challenges and implementation strategies employed to achieve this high uptake.

Prue, G., M. Lawler, P. Baker and S. Warnakulasuriya (2017). "**Human papillomavirus (HPV): making the case for 'Immunisation for All'**." Oral Dis **23**(6): 726-730.

Human papillomavirus (HPV) contributes to the most common sexually transmitted infections, with repeated and persistent infection with particular types causing disease in both men and women. Infection with low-risk HPV types can lead to genital warts and benign lesions of the oral cavity, while high-risk types can cause various HPV-related malignancies. The incidence of head and neck cancers has been rising in the past number of decades mostly due to oropharyngeal cancer linked to HPV infection. HPV vaccination has been shown to be effective for cervical and other anogenital HPV-related cancers, and there is significant potential for HPV vaccination to prevent oropharyngeal cancers, given that the HPV types implicated in this disease can be protected against by the HPV vaccine. Few countries have implemented a universal HPV vaccination programme for males and females, with many countries arguing that female-only vaccination programmes protect males via herd immunity and that men who have sex with men will be protected via targeted vaccination programmes. We argue these may be limited in their effectiveness. We propose that the most effective, practical, ethical and potentially cost-effective solution is universal HPV vaccination that might lead to control of HPV-related diseases in men and women alike.

Prue, G. and O. Santin (2015). "**HPV vaccine acceptance in male adolescents**." Psychooncology.

Radley, D., A. Saah and M. Stanley (2016). "**Persistent infection with human papillomavirus 16 or 18 is strongly linked with high-grade cervical disease**." Hum Vaccin Immunother **12**(3): 768-772.

We investigated the relationship between high-grade cervical disease (cervical intraepithelial neoplasia [CIN] 2, CIN3 or adenocarcinoma in situ) and persistent infection with HPV16 and/or HPV18 (HPV16/18) among 3970 women who received placebo in 3 clinical trials of a quadrivalent HPV vaccine. Statistical analysis (odds ratios, sensitivity, specificity, negative and positive predictive values, negative and positive likelihood ratios) showed that patients with a persistent infection with HPV16/18 had a much greater risk of HPV16/18-related high-grade cervical disease. Furthermore, subjects without a persistent infection with HPV16/18 were unlikely to have HPV16/18-related high-grade cervical disease. These results suggest that persistent infection with HPV16/18 meets the criteria for a surrogate endpoint for HPV16/18-related high-grade cervical disease and may be used as such in future clinical studies with prophylactic HPV vaccines and in natural history studies.

Riedmann, E. M. (2014). "**HPV vaccination campaign could change from three to two doses in the UK**." Hum Vaccin Immunother **10**(5): 1142-1142.

Rockliffe, L., J. Waller, L. A. Marlow and A. S. Forster (2017). "**Role of ethnicity in human papillomavirus vaccination uptake: a cross-sectional study of girls from ethnic minority groups attending London schools**." BMJ Open **7**(2): e014527.

OBJECTIVES: Research suggests that girls from ethnic minority groups are less likely to receive the human papillomavirus (HPV) vaccination than white British girls; however, the specific ethnic minority groups that have lower uptake have not been identified. This study aimed to examine the relationship between school-level uptake and ethnicity as well as uptake and other ethnicity-related factors, to understand which specific groups are less likely to receive the vaccination. METHODS: Aggregated uptake rates from 195 schools were obtained for each of the three recommended vaccine doses from 2008 to 2010. Census data at the lower super output area (LSOA) level for the postcode of each school were also obtained, describing the ethnic breakdown of the resident population (ethnicity, language spoken, religion, proficiency in English and duration of residency in the UK). These were used as proxy measures of the ethnic make-up of the schools. The most prevalent non-majority group for each ethnicity and ethnicity-related factor was assigned to each school. Analyses explored differences in uptake by ethnicity and ethnicity-related factors. RESULTS: No significant differences in vaccination uptake were found by ethnicity or ethnicity-related factors, although descriptive differences were apparent. Schools in areas where black ethnicities were the most prevalent non-white British ethnicities had consistently low rates of uptake for all doses. Schools in areas where some Asian ethnicities were the most prevalent non-white British ethnicities had consistently high rates of uptake for all doses. There was evidence of variability in mean uptake rates for ethnicities within 'black' and 'Asian' ethnic groups. CONCLUSIONS: Future research would benefit from focusing on specific ethnicities rather than broad ethnic categories. Replication of this study with a larger sample and using complete individual-level data, collected on a national level, would provide a clearer indication of where ethnic differences in HPV vaccination uptake exist.

Sacks, R. J., A. J. Copas, D. M. Wilkinson and A. J. Robinson (2014). "**Uptake of the HPV vaccination programme in England: a cross-sectional survey of young women attending sexual health services**." Sex Transm Infect **90**(4): 315-321.

OBJECTIVES: The U.K. human papilloma virus (HPV) vaccination programme requires 80% uptake to have a significant impact on cervical cancer rates. Uptake in the first three years of the programme was 66%. We report the results of a cross-sectional survey of young women attending sexual health services (SHS) in England, reviewing HPV vaccination uptake and prevalence of HPV-related risk factors. METHODS: An anonymous questionnaire surveyed women aged 13-19 attending 19 hospital-based and 13 community-based SHS across England, March-August 2011. Data were analysed using multiple logistic regression. RESULTS: 2247 questionnaires were completed. Compared with national data, respondents had higher smoking rates (48% vs. 14% of 15 year olds), coitarche under-16 (52% vs. 38%), previous sexually transmitted infections (STIs) (25% vs. 4%) and a higher proportion not in education, employment or training (NEETs) (8% vs. 2% of 16 year olds). Seventy-four per cent had been offered the vaccination, with significantly lower offer rates in London, non-white ethnicities, 17-19 year olds, NEETs, smokers and those with previous STIs (all $p<0.05$ in multivariate analysis). Sixty-five per cent of those offered, completed, with significantly lower completion rates in London, non-white ethnicities, 17-19 year olds, NEETs, smokers and those with previous STIs (all $p<0.05$ in multivariate analysis). Overall completion rate was 47%. CONCLUSIONS: We observed lower vaccination offer and completion rates and higher prevalence of HPV-related risk factors compared with national data. The highest risk individuals were the least likely to have been offered or to have completed the course. This survey highlights an opportunity for primary prevention by routinely offering the HPV vaccine to eligible women attending SHS.

Sadler, L., S. A. Roberts, G. Hampal, D. McManus, D. Mandal and L. Brabin (2015). "**Comparing risk behaviours of human papillomavirus-vaccinated and non-vaccinated women**." J Fam Plann Reprod Health Care **41**(4): 255-258.

BACKGROUND: Since September 2008, a national vaccine programme in the UK has offered routine human papillomavirus (HPV) vaccination to young women aged 12-13 years. A catch-up programme also offered HPV vaccination to women born after 1 September 1990. AIM: To compare indicators of risk and preventive behaviours among young women attending genitourinary medicine (GUM) clinics who had, and had not, received at least one dose of HPV vaccine. METHODS: Clinical histories and HPV vaccination status were obtained from 363 participants eligible for HPV vaccination (Cervarix((R))) in the UK vaccination programme (born after 1 September 1990) attending GUM clinics in the North West of England. Using logistic regression, markers of sexual and non-sexual risk behaviours were compared between vaccinated and unvaccinated women. RESULTS: At least one dose of HPV vaccine had been received by 63.6% (n=231) of participants. Unvaccinated women demonstrated higher levels of risky behaviour than those who had undergone HPV vaccination. Unvaccinated women were significantly more likely to have had three or more partners in the last 6 months, attended the clinic with symptoms, not used a condom at first sexual intercourse, had anal intercourse with their last sexual contact, to have tested positive for Chlamydia trachomatis diagnosis at the clinic visit and to be a current smoker. CONCLUSIONS: In the UK, where vaccine coverage is high, failure to initiate HPV vaccination amongst GUM attendees is a marker of high-risk behaviours. As a result, HPV vaccination status should be ascertained as part of an individual's clinical history by sexual health services to ensure advice and counselling is provided to those at greatest risk of HPV-associated disease.

Sadlier, C., A. Lynam, S. O'Dea, S. Delamere, M. Quinlan, S. Clarke, O. Sheils and C. Bergin (2016). "**HPV vaccine acceptability in HIV-infected and HIV negative men who have sex with men (MSM) in Ireland**." Hum Vaccin Immunother **12**(6): 1536-1541.

Background Men who have sex with men (MSM), particularly HIV-infected MSM are disproportionately affected by HPV infection and associated disease. The HPV vaccine has potential to greatly reduce the burden of HPV-associated disease including anal cancer in MSM. The efficacy of the HPV vaccine is dependent on high levels of vaccine uptake. The aim of this study was to examine HPV vaccine acceptability and factors influencing vaccine acceptability in MSM in Ireland. Methods A self-administered survey was distributed to HIV-infected and HIV negative MSM examining HPV vaccine acceptability and factors associated with vaccine acceptability. Logistic regression was used to identify key variables and predictors of HPV vaccine acceptability. Results 302 MSM participated in the study. Acceptability of HPV vaccine was 31% (unconditional), 51% (conditional on stated efficacy and a cost of euro300), 65% (conditional on stated efficacy and a cost of euro100) and 78% (conditional on stated efficacy and no cost). Cost was negatively associated with HPV vaccine acceptability ($p<0.01$) while knowledge of HPV vaccine efficacy was significantly associated with vaccine acceptability, even in the context of associated cost ($p<0.01$). Conclusions Acceptability of HPV vaccine in MSM in Ireland is high based on no cost vaccine and on stated vaccine efficacy (78%). Cost is negatively associated with vaccine acceptability. Understanding levels of knowledge of HPV infection, HPV associated disease and attitudes toward HPV vaccination are important as they will contribute to HPV vaccine acceptability among MSM and will help guide effective preventive programs.

Saso, S., S. Ghaem-Maghami, J. Chatterjee, O. Naji, A. Farthing, P. Mason, A. McIndoe, V. Hird, L. Ungar, G. Del Priore and J. R. Smith (2012). "**Abdominal radical trachelectomy in West London**." Bjog **119**(2): 187-193.

OBJECTIVE: Traditionally, the surgical management of invasive cervical carcinoma that has progressed beyond microinvasion has been a radical abdominal hysterectomy. However, this results in the loss of fertility, with significant consequences for the young patient. This report describes abdominal radical trachelectomy (ART) as a potential replacement for radical hysterectomy in patients with stage IA2-IIA cervical cancer who desire a fertility-sparing procedure without decreasing the curative rates. DESIGN: Observational, retrospective study. SETTING: Teaching hospital and regional cancer centre in London, UK. POPULATION: Patients undergoing ART. METHODS: Patients presenting during the period 2000-2009 with cervical cancer stage IA2-IIA were offered a trachelectomy, if they expressed a desire to preserve fertility. The type of trachelectomy (vaginal/abdominal) was chosen based on patient anatomy and neoplastic and magnetic resonance imaging characteristics. Each patient was counselled as to the experimental nature of the procedure. MAIN OUTCOME MEASURES: Survival, recurrence and fertility issues among ART patients. RESULTS: A total of 30 patients underwent ART (open and laparoscopic) between 2001 and 2009. Three patients presented with a recurrence, two of which have died (median follow-up: 24 months). Only three patients required further surgical re-intervention because of operative complications. Ten patients attempted to conceive, resulting in three conceptions (30%) and two live children. CONCLUSIONS: Abdominal radical trachelectomy provides a feasible, cost-effective and safe treatment option for young women who have been diagnosed with early-stage cervical cancer and wish to preserve their fertility.

Shapiro, G. K., D. Surian, A. G. Dunn, R. Perry and M. Kelaher (2017). "**Comparing human papillomavirus vaccine concerns on Twitter: a cross-sectional study of users in Australia, Canada and the UK**." BMJ Open **7**(10): e016869.

OBJECTIVE: Opposition to human papillomavirus (HPV) vaccination is common on social media and has the potential to impact vaccine coverage. This study aims to conduct an international comparison of the proportions of tweets about HPV vaccines that express concerns, the types of concerns expressed and the social connections among users posting about HPV vaccines in Australia, Canada and the UK. DESIGN: Using a cross-sectional design, an international comparison of English language tweets about HPV vaccines and social connections among Twitter users posting about HPV vaccines between January 2014 and April 2016 was conducted. The Health Belief Model, one of the most widely used theories in health psychology, was used as the basis for coding the types of HPV vaccine concerns expressed on Twitter. SETTING: The content of tweets and the social connections between users who posted tweets about HPV vaccines from Australia, Canada and the UK. POPULATION: 16 789 Twitter users who posted 43 852 tweets about HPV vaccines. MAIN OUTCOME MEASURES: The proportions of tweets expressing concern, the type of concern expressed and the proportions of local and international social connections between users. RESULTS: Tweets expressing concerns about HPV vaccines made up 14.9% of tweets in Canada, 19.4% in Australia and 22.6% in the UK. The types of concerns expressed were similar across the three countries, with concerns related to 'perceived barriers' being the most common. Users expressing concerns about HPV vaccines in each of the three countries had a relatively high proportion of international followers also expressing concerns. CONCLUSIONS: The proportions and types of HPV vaccine concerns expressed on Twitter were similar across the three countries. Twitter users who mostly expressed concerns about HPV vaccines were better connected to international users who

shared their concerns compared with users who did not express concerns about HPV vaccines.

Sharp, L., S. Cotton, J. Little, N. M. Gray, M. Cruickshank, L. Smart, A. Thornton, N. Waugh and L. Walker (2013). "**Psychosocial impact of alternative management policies for low-grade cervical abnormalities: results from the TOMBOLA randomised controlled trial**." PLoS One **8**(12): e80092.

BACKGROUND: Large numbers of women who participate in cervical screening require follow-up for minor cytological abnormalities. Little is known about the psychological consequences of alternative management policies for these women. We compared, over 30-months, psychosocial outcomes of two policies: cytological surveillance (repeat cervical cytology tests in primary care) and a hospital-based colposcopy examination. METHODS: Women attending for a routine cytology test within the UK NHS Cervical Screening Programmes were eligible to participate. 3399 women, aged 20-59 years, with low-grade abnormal cytology, were randomised to cytological surveillance (six-monthly tests; n = 1703) or initial colposcopy with biopsies and/or subsequent treatment based on colposcopic and histological findings (n = 1696). At 12, 18, 24 and 30-months post-recruitment, women completed the Hospital Anxiety and Depression Scale (HADS). A subgroup (n = 2354) completed the Impact of Event Scale (IES) six weeks after the colposcopy episode or first surveillance cytology test. Primary outcomes were percentages over the entire follow-up period of significant depression (>/= 8) and significant anxiety (>/= 11; "30-month percentages"). Secondary outcomes were point prevalences of significant depression, significant anxiety and procedure-related distress (>/= 9). Outcomes were compared between arms by calculating fully-adjusted odds ratios (ORs) for initial colposcopy versus cytological surveillance. RESULTS: There was no significant difference in 30-month percentages of significant depression (OR = 0.99, 95% CI 0.80-1.21) or anxiety (OR = 0.97, 95% CI 0.81-1.16) between arms. At the six-week assessment, anxiety and distress, but not depression, were significantly less common in the initial colposcopy arm (anxiety: 7.9% vs 13.4%; OR = 0.55, 95% CI 0.38-0.81; distress: 30.6% vs 39.3%, OR = 0.67 95% CI 0.54-0.84). Neither anxiety nor depression differed between arms at subsequent time-points. CONCLUSIONS: There was no difference in the longer-term psychosocial impact of management policies based on cytological surveillance or initial colposcopy. Policy-makers, clinicians, and women themselves can be reassured that neither management policy has a significantly greater psychosocial cost. TRIAL REGISTRATION: Controlled-Trials.com ISRCTN 34841617.

Sharp, W. M. J., T. Nadarzynski and N. E. Dufty (2017). "**Time to consider a targeted HPV vaccination programme for male military recruits**." J R Army Med Corps.

Human papillomaviruses (HPV) are the most common type of sexually transmitted infection in men but also related to high-risk cancers. This article considers the epidemiology of HPV in the male military population, the UK vaccination programme and the current UK Joint Committee on Vaccination and Immunisation recommendations. Military men may not benefit from HPV herd immunity and may have a different risk profile; vaccination may in turn reduce the operational burden of HPV-related disease within this population. Military men may benefit from a targeted vaccination programme, and the paper calls for urgent consideration of approaches that could protect them from acquiring HPV.

Sherman, S. M. and E. L. Lane (2015). "**Awareness of Risk Factors for Breast, Lung and Cervical Cancer in a UK Student Population**." J Cancer Educ **30**(4): 660-663.

The objective of this study is to identify levels of risk awareness for breast, lung and cervical cancer, in a UK student population. A sample of male (N=62) and female (N=58) university students, mean age 21.62 years completed a questionnaire identifying which risk factors they knew for each cancer. Analysis of variance was used to compare differences in risk awareness across gender and cancer types. Risk factor awareness was highest for lung cancer (0.78), mid-range for breast cancer (0.61) and lowest for cervical cancer (0.47). Women had greater risk factor awareness (0.67) than males (0.57) across all three cancers. There is also significant belief in mythic risk factors such as stress (from 14 to 40% across the three cancers). Previous research has demonstrated that risk factor awareness increases with educational status, yet even in a university student population, in which the majority of females would have been offered the HPV vaccination, risk factor awareness for cancers is variable. More health education is needed particularly around the risk factors for cervical cancer.

Sinka, K., K. Kavanagh, R. Gordon, J. Love, A. Potts, M. Donaghy and C. Robertson (2014). "**Achieving high and equitable coverage of adolescent HPV vaccine in Scotland**." J Epidemiol Community Health **68**(1): 57-63.

BACKGROUND AND METHODS: The national immunisation records of over 220,000 girls offered vaccine in the routine or catch-up programme of the Human papillomavirus (HPV) programme in Scotland were analysed. Descriptive statistics and multilevel modelling were used to determine individual and organisational factors associated with uptake. Age, school year, school denomination, deprivation and, for school-leavers, mode of delivery were explored. Additional aggregate data were used to examine the effect of late uptake of missed doses in the routine vaccination programme. RESULTS: School-based delivery initially achieved over 80% uptake of complete courses in routine and catch-up age groups. Within this context of generally high coverage, there was an association between individual level deprivation and lower uptake, and a decline in in-year course completion over time. However, later uptake of missed doses in the following year substantially decreased these effects. There was no influence on uptake of the type of school (non-denominational/denominational). Vaccination of school-leavers in the catch-up campaign had lower coverage, with 50% starting and 30% completing the course in-year. There was no clear advantage of vaccination through general practice or through Board-run clinics in reaching this group. CONCLUSIONS: School-based vaccination can achieve high and equitable uptake of a multidose vaccine in a routine immunisation programme. Sustained high coverage with HPV vaccine across Scotland provides a stable platform for planning future strategies for cervical screening and understanding the impact of the vaccination at a population level.

Spencer, A. M., S. A. Roberts, A. Verma, J. Patnick, P. Elton and L. Brabin (2015). "**Effect of Human Papillomavirus vaccination of daughters on the cervical screening uptake of their non-vaccinated mothers**." Eur J Public Health **25**(6): 1097-1100.

AIM: This study investigated return to cervical screening rates for 112,451 under-screened mothers of daughters offered Human Papillomavirus (HPV) vaccination over two school academic years and a comparator group of women with no vaccine-eligible daughter. RESULTS: Mothers returned to screening more often than the comparator group: odds ratio (OR) 1.04 (95% confidence intervals 1.02-1.07) for lapsed and 1.57 (1.48-1.67) for never screened. Screening return was significantly higher in the year prior to HPV vaccination for lapsed mothers

(OR = 1.06) and in the current vaccination year for lapsed and never screened mothers (OR = 1.05 and 1.16 respectively). CONCLUSION: The modest increase in screening attendance indicates a potential for the HPV vaccine programme to increase screening uptake of mothers.

Stanley, M. (2014). "**HPV vaccination in boys and men**." Hum Vaccin Immunother **10**(7): 2109-2111.
Human papillomaviruses are DNA viruses that infect skin or mucosal cells. In the genital tract HPV (especially types 6 and 11) cause genital warts, the commonest viral sexually transmitted disease. At least 13 of the more than 100 known HPV genotypes are oncogenic "high-risk" genotypes. The 2 most common of these (genotypes 16 and 18) cause approximately 70% of all cervical cancers. Oncogenic HPVs particularly HPV 16 are associated with other anogenital cancers, anus, vagina, vulva and penis, and cancers of the head and neck and current estimates are that 5.2% of all cancers are HPV associated. In industrialised countries cervical cancer is controlled by secondary intervention other HPV associated malignancies are increasing in incidence and the burden of HPV associated disease in men is now comparable to that in women in economically developed countries. Randomized control trials with the quadrivalent HPV VLP vaccine demonstrate robust antibody responses and high efficacy against genital warts anal precancers in men. Few countries have recommended male vaccination on the basis that this is not cost effective. However gender-neutral vaccination has been recommended in the USA, Canada, Austria, and Australia. Careful cost effective modeling has preceded these decisions showing that when the burden of disease in men is included in the models then, depending upon coverage, vaccine price, and other factors male vaccination can become cost effective.

Stanley, M., C. O'Mahony and S. Barton (2014). "**HPV vaccination**." Bmj **349**: g4783.

Tanton, C., D. Mesher, S. Beddows, K. Soldan, S. Clifton, K. Panwar, N. Field, C. H. Mercer, A. M. Johnson and P. Sonnenberg (2017). "**Human papillomavirus (HPV) in young women in Britain: Population-based evidence of the effectiveness of the bivalent immunisation programme and burden of quadrivalent and 9-valent vaccine types**." Papillomavirus Res **3**: 36-41.
BACKGROUND: In 2008, the UK introduced an HPV immunisation programme in girls. Population-based prevalence estimates of bivalent (HPV-16/18), quadrivalent (HPV-6/11/16/18) and 9-valent (HPV-6/11/16/18/31/33/45/52/58) vaccine types, and comparison over time, are needed to monitor impact, evaluate effectiveness and guide decision-making on vaccination strategies. METHODS: The third National Survey of Sexual Attitudes and Lifestyles (Natsal-3) in 2010-12, tested urine for HPV from 2569 sexually-experienced women aged 16-44. We report type-specific HPV prevalence and compare results with 1798 women in Natsal-2 (1999-2001) using age-adjusted prevalence ratios (APR). FINDINGS: In Natsal-3, 4.2% of women aged 16-44y were positive for HPV-16/18 and 2.9% for HPV-6/11. In 16-20 year olds, 4.5%, 10.8% and 20.7% had at least one bivalent, quadrivalent or 9-valent vaccine type, respectively. Three-dose vaccine coverage was 52.0% in women aged 18-20y. In this age group, HPV-16/18 prevalence was lower in Natsal-3 than Natsal-2 (5.8% vs 11.2%; APR=0.48[95%CI: 0.24-0.93]), however, prevalences of HPV-6/11, HPV-31/33/45 and HPV-52/58 were unchanged. HPV-16/18 prevalence was also unchanged in women aged 21-44y (APR=0.85[0.61-1.19]). INTERPRETATION: These probability surveys provide evidence of the impact of the bivalent immunisation programme. Reductions were specific to HPV-16/18 and to the age group eligible for vaccination. However, substantial vaccine-preventable HPV remains.

Tanton, C., K. Soldan, S. Beddows, C. H. Mercer, J. Waller, N. Field, S. Clifton, A. J. Copas, K. Panwar, P. Manyenga, F. da Silva, K. Wellings, C. A. Ison, A. M. Johnson and P. Sonnenberg (2015). "**High-Risk Human Papillomavirus (HPV) Infection and Cervical Cancer Prevention in Britain: Evidence of Differential Uptake of Interventions from a Probability Survey**." Cancer Epidemiol Biomarkers Prev **24**(5): 842-853.

BACKGROUND: The third British National Survey of Sexual Attitudes and Lifestyles (Natsal-3) provides an opportunity to explore high-risk human papillomavirus (HR-HPV) and uptake of cervical screening and HPV vaccination in the general population. METHODS: Natsal-3, a probability sample survey of men and women ages 16 to 74, resident in Britain, interviewed 8,869 women in 2010 to 2012. We explored risk factors for HR-HPV (in urine from 2,569 sexually experienced women ages 16 to 44), nonattendance for cervical screening in the past 5 years, and noncompletion of HPV catch-up vaccination. RESULTS: HR-HPV was associated with increasing numbers of lifetime partners, younger age, increasing area-level deprivation, and smoking. Screening nonattendance was associated with younger and older age, increasing area-level deprivation (age-adjusted OR 1.91, 95% confidence interval, 1.48-2.47 for living in most vs. least deprived two quintiles), Asian/Asian British ethnicity (1.96, 1.32-2.90), smoking (1.97, 1.57-2.47), and reporting no partner in the past 5 years (2.45, 1.67-3.61 vs. 1 partner) but not with HR-HPV (1.35, 0.79-2.31). Lower uptake of HPV catch-up vaccination was associated with increasing area-level deprivation, non-white ethnicity, smoking, and increasing lifetime partners. CONCLUSIONS: Socioeconomic markers and smoking were associated with HR-HPV positivity, nonattendance for cervical screening, and noncompletion of catch-up HPV vaccination. IMPACT: The cervical screening program needs to engage those missing HPV catch-up vaccination to avoid a potential widening of cervical cancer disparities in these cohorts. As some screening nonattenders are at low risk for HR-HPV, tailored approaches may be appropriate to increase screening among higher-risk women.

Thompson, S. R., G. P. Delaney, G. S. Gabriel and M. B. Barton (2014). "**Patterns of care study of brachytherapy in New South Wales: cervical cancer treatment quality depends on caseload**." J Contemp Brachytherapy **6**(1): 28-32.

PURPOSE: We previously conducted modelling and a patterns of care study (POCS) that showed gynaecological brachytherapy (BT) was underutilized in New South Wales (NSW), the USA and Western Europe. The aim of the current study was to assess the quality of cervical BT in NSW, and to determine if caseload affects quality of treatment delivery. MATERIAL AND METHODS: All nine NSW radiation oncology departments that treated patients with cervical BT in 2003 were visited. Patient, tumour and treatment related data were collected. Quality of BT was assessed using published quality benchmarks. Higher and lower caseload departments were compared. RESULTS: The four higher cervical BT caseload departments treated 11-15 NSW residents in 2003, compared to 1-8 patients for the lower caseload departments. Cervix cancer patients treated at the higher caseload departments were more likely to be treated to a point A dose >/= 80 Gy (58% vs. 14%, p = 0.001), and to have treatment completed within 8 weeks (66% vs. 35%, p = 0.02). Despite higher point A doses, there was no significant difference in proportions achieving lower than recommended rectal or bladder doses, implying better BT insertions in higher caseload departments. CONCLUSIONS: Cervical BT in NSW was dispersed amongst a large number of departments and was frequently of sub-optimal quality. Higher quality BT was achieved in departments treating at least 10 patients per year. It is likely that improved outcomes will be achievable if at least 10 patients are treated per department per year.

Walker, S. and W. Hamilton (2017). "**Risk of cervical cancer in symptomatic women aged >/=40 in primary care: A case-control study using electronic records**." Eur J Cancer Care (Engl) **26**(3).

There are approximately 3,000 new UK diagnoses of cervical cancer annually, with many women presenting symptomatically. We aimed to identify and quantify features of cervical cancer in primary care in a case-control study in the UK. Putative features of cervical cancer were identified, and odd ratios and positive predictive values (PPVs) were calculated. About 1,006 women aged >/=40 years diagnosed with cervical cancer and 4,992 age-, sex- and practice-matched controls were selected from the Clinical Practice Research Datalink. Median age at diagnosis was 61 years (interquartile range 51-75). Seven symptoms and two abnormal investigations were associated with cervical cancer: post-menopausal bleeding, odds ratio 43 (95% confidence interval 25, 75); vaginal discharge or vaginitis 8.8 (5.2, 15), intermenstrual bleeding 4.7 (1.6, 14); haematuria 4.6 (2.1, 10); irregular menstruation 3.8 (1.6, 9.0); urinary tract infection 1.9 (1.3, 2.8); abdominal pain 1.8 (1.4, 2.5); high white cell count 5.1 (2.9, 8.8) and low haemoglobin 2.6 (1.8, 3.8): all p < .005. The PPV of cervical cancer in women aged >/=55 with post-menopausal bleeding was 4.6% (2.5, 8.3). Other than for post-menopausal bleeding no symptom is high risk. Some symptoms, particularly haematuria, may be helpful. The primary care clinician must consider the unlikely diagnosis when the likely diagnosis does not settle with treatment.

Wang, C. (2016). "**The impact of car ownership and public transport usage on cancer screening coverage: Empirical evidence using a spatial analysis in England**." J Transp Geogr **56**: 15-22.

A spatial analysis has been conducted in England, with the aim to examine the impact of car ownership and public transport usage on breast and cervical cancer screening coverage. District-level cancer screening coverage data (in proportions) and UK census data have been collected and linked. Their effects on cancer screening coverage were modelled by using both non-spatial and spatial models to control for spatial correlation. Significant spatial correlation has been observed and thus spatial model is preferred. It is found that increased car ownership is significantly associated with improved breast and cervical cancer screening coverage. Public transport usage is inversely associated with breast cancer screening coverage; but positively associated with cervical cancer screening. An area with higher median age is associated with higher screening coverage. The effects of other socio-economic factors such as deprivation and economic activity have also been explored with expected results. Some regional differences have been observed, possibly due to unobserved factors. Relevant transport and public health policies are thus required for improved coverage. While restricting access to cars may lead to various benefits in public health, it may also result in worse cancer screening uptake. It is thus recommended that careful consideration should be taken before implementing policy interventions.

Willame, C., D. Rosillon, J. Zima, M. G. Angelo, A. L. Stuurman, H. Vroling, R. Boggon, E. M. Bunge, M. Pladevall-Vila and L. Baril (2016). "**Risk of new onset autoimmune disease in 9- to 25-year-old women exposed to human papillomavirus-16/18 AS04-adjuvanted vaccine in the United Kingdom**." Hum Vaccin Immunother **12**(11): 2862-2871.

To assess the risk of autoimmune disease (AD) in 9-25 year-old women within 1 year after the first AS04-HPV-16/18vaccine dose, a retrospective, observational database cohort study was conducted using CPRD GOLD. From CPRD GOLD 4 cohorts (65,000 subjects each) were retrieved: 1 exposed female cohort (received >/=1 AS04-HPV-16/18 vaccine dose between Sep2008-Aug2010) and 3 unexposed cohorts: historical female (Sep2005-Aug2007), concurrent male, and

historical male. Co-primary endpoints were confirmed neuroinflammatory/ophthalmic AD and other AD, secondary endpoints were confirmed individual AD. Risk of new onset of AD was compared between cohorts (reference: historical cohort) using Poisson regression. The main analysis using confirmed cases showed no neuroinflammatory/ophthalmic AD cases in the female exposed cohort. Incidence rate ratio (IRR) (95% CI) of other AD was 1.41 (0.86 to 2.31) in female and 1.77 (0.94 to 3.35) in male cohorts when compared to the female and male historical cohort, respectively. Secondary endpoints were evaluated for diseases with >10 cases, which were Crohn's disease (IRR: 1.21 [0.37 to 3.95] for female and 4.22 [0.47 to 38.02] for male cohorts), autoimmune thyroiditis (IRR: 3.75 [1.25 to 11.31] for female and no confirmed cases for male cohorts) and type 1 diabetes (IRR: 0.30 [0.11 to 0.83] for female and 2.46 [1.08 to 5.60] for male cohorts). Analysis using confirmed and non-confirmed cases showed similar results, except for autoimmune thyroiditis in females, IRR: 1.45 (0.79 to 2.64). There was no evidence of an increased risk of AD in women aged 9 to 25 years after AS04-HPV-16/18 vaccination.

Session 5 HPV and HPv related cancer screening programmes in Ireland and the UK

HPV screening programme and implementation in Ireland
Grainne Flannely and John Gleeson
References provided by the speaker:
Flannelly, G, Mooney MT, Greehy H, Keogh E, Mc Nally S, Fitzpatrick PE. **Establishment of a national cervical screening programme in Ireland, CervicalCheck: the first six years**. European journal of Cancer Prevention 2016 (In press)

Self sampling in Scotland
Grazyna Stanczuk
References provided by the speaker:
Stanczuk G, Baxter G, Currie H, Lawrence J, Cuschieri K, Wilson A, Arbyn M. **Clinical validation of hrHPV testing on vaginal and urine self-samples in primary cervical screening (cross-sectional results from the Papillomavirus Dumfries and Galloway-PaVDaG study**). BMJ Open. 2016 Apr 25;6(4):e010660. doi: 10.1136/bmjopen-2015-010660.

Stanczuk GA, Baxter GJ, Currie H, Forson W, Lawrence JR, Cuschieri K, Wilson A, Patterson L, Govan L, Black J, Palmer T, Arbyn M. **Defining Optimal Triage Strategies for hrHPV Screen-Positive Women-An Evaluation of HPV 16/18 Genotyping, Cytology, and p16/Ki-67 Cytoimmunochemistry**. Cancer Epidemiol Biomarkers Prev. 2017 Nov;26(11):1629-1635. doi: 10.1158/1055-9965.EPI-17-0534. Epub 2017 Sep 8.

Session 7 Challenges and opportunities in HPV Control

The HPV crisis in Ireland: a survey among health care providers

Donal Brenan

References provided by the speaker:

Health Protection Surveillance Centre . **HPV vaccine uptake in Ireland: 2015/2016**, 2016. https://www.hpsc.ie/az/vaccinepreventable/vaccination/immunisationuptakestatistics/hpvimmunisationuptakestatistics/File,16039,en.pdf (Accessed 13th November 2017)

Feemster KA, Middleton M, Fiks AG, Winters S, Kinsman SB, Kahn JA. **Does intention to recommend HPV vaccines impact HPV vaccination rates?** Hum Vaccin Immunother 2014; 10(9): 2519-26.

Klosky JL, Hudson MM, Chen Y, et al. **Human Papillomavirus Vaccination Rates in Young Cancer Survivors**. J Clin Oncol 2017; 35(31): 3582-90.

Hanley SJ, Yoshioka E, Ito Y, Kishi R. HPV vaccination crisis in Japan. Lancet 2015; 385(9987): 2571.
Global Advisory Committee on Vaccine Safety. Brief report on the June 2016 meeting; Update on HPV vaccine safety: GACVS, 2016.
http://apps.who.int/iris/bitstream/10665/255870/1/WER9228.pdf?ua=1. Accessed 13th November 2017

Gender neutral vaccination. The discussion in the UK and globally

Mark Jit

References provided by the speaker:

Brisson M et al. **Population-level impact, herd immunity and elimination after HPV vaccination: a systematic review and meta-analysis of predictions of 16 transmission dynamic models**. Lancet Public Health 2016; 1(1):e8-17.

Brisson M, van de Velde N, Franco EL, Drolet M, Boily MC. **Incremental impact of adding boys to current human papillomavirus vaccination programs: role of herd immunity**. J Infect Dis. 2011 Aug 1;204(3):372-6.

Bogaards JA, Wallinga J, Brakenhoff RH, Meijer CJ, Berkhof J. **Direct benefit of vaccinating boys along with girls against oncogenic human papillomavirus: bayesian evidence synthesis**. BMJ. 2015 May 12;350:h2016.

Lin A, Ong KJ, Hobbelen P, King E, Mesher D, Edmunds WJ, Sonnenberg P, Gilson R, Bains I, Choi YH, Tanton C, Soldan K, Jit M. **Impact and cost-effectiveness of selective human papillomavirus vaccination of men who have sex with men**. Clinical Infectious Diseases 2017; 64(5):580-8.

References session 5 and 7 via PubMed search:

A PubMed search was performed with the following selection criteria:

1. Ireland AND cervical screening in the last 5 years: 15.
2. England AND cervical screening in the last 5 years: 66.
3. Northern Ireland AND cervical screening in the last 5 years: 6.
4. Wales AND cervical screening in the last 5 years: 25.
5. UK AND cervical screening in the last 5 years: 59.

The list contains a manual selection of **90** publications relevant to session 5 and 7.

Agapova, M., A. Duignan, A. Smith, C. O'Neill and A. Basu (2015). "**Long-term costs of introducing HPV-DNA post-treatment surveillance to national cervical cancer screening in Ireland**." Expert Rev Pharmacoecon Outcomes Res **15**(6): 999-1005.

INTRODUCTION: Co-testing (cytology plus human papillomavirus DNA testing) as part of cervical cancer surveillance in Ireland increases one-time testing costs. Of interest to policy makers was the long-term impact of these costs accompanied by decreases in intensity of recalls for women with no detected abnormalities. METHODS: A cost analysis of cytology-only and co-testing strategy was implemented using decision analytic modeling, aggregating testing utilization and costs for each of the two strategies over 12 years. RESULTS: Aggregated incremental costs of the co-testing strategy were positive for the first 3 years but became negative thereafter, generating a cost savings of roughly euro20 million in favor of the cytology-only strategy over a 12-year period. Results were robust over a range of sensitivity analyses with respect to discount and attrition rates. DISCUSSION: This analysis provided valuable information to policy makers contributing to the introduction of co-testing for post-treatment surveillance (PTS) in Ireland.

Albrow, R., H. Kitchener, N. Gupta and M. Desai (2012). "**Cervical screening in England: the past, present, and future**." Cancer Cytopathol **120**(2): 87-96.

Cervical screening in England commenced in a disorganized fashion in 1964. The flaws of this approach became apparent in the mid-1980s and led to the inception of the National Health Service Cervical Screening Programme (NHSCSP). The main features of this program are its population-based registry, accessibility to all women within the screening age range, its systematic process of call and recall, national coordination, and quality assurance. Its success is in part based on its ability to evolve as evidence necessitates, and throughout the period of 2000-2010, it embarked upon a series of developments involving liquid-based cytology, which also provided the means to conduct reflex high-risk human papillomavirus (HR-HPV) testing and the potential to automate the screening process. As a result of evidence acquired since 2000, the NHSCSP is currently based on a system of primary cytology with HPV triage for low-grade abnormalities combined with cytology plus a HR-HPV "test of cure" for women who have received treatment for cervical intraepithelial neoplasia. Future challenges for the program will involve finding solutions to increasing screening uptake among women <30 years of age-a problem that may be exacerbated when vaccinated women reach the screening age, while making plans to accommodate HPV primary screening.

Ali, A. A., D. Richardson and N. Hill (2013). "**A retrospective study of cervical screening in women under 25 years (2005-2009)**." Arch Gynecol Obstet **287**(4): 765-769.

OBJECTIVE: Since 2003, when the age threshold of cervical screening in England has been raised from 20 to 25, there have been many calls to restore the previous starting age for cervical screening as there are concerns about the delaying of initiating cervical screening may result in an increase in the risk of cervical cancer. We conducted a retrospective study to analyse the safety of changing the starting age of cervical screening programme in England to the age of 25, by reviewing the cervical cytology performed in 426 women under 25 years in Bromley Borough of London, UK, between 2005 and 2009. STUDY DESIGN: We conducted a retrospective analysis of 426 women under 25 years, who were referred with cervical smears taken at Bromley PCT's to the colposcopy clinic at Bromley Hospitals, South London Healthcare NHS Trust, over a 4-year period, between 2005 and 2009. The colposcopy findings and histology results were reviewed and analysed. RESULTS: In our review, 44.80 % of smears showed mild dyskaryosis. 23 and 12 % showed moderate dyskaryosis and severe dyskaryosis, respectively. 11.2 % had borderline

smear, and 0.2 % revealed glandular changes. On colposcopic examination, only 16.2 % (69) were reported as normal; however, 25.8, 20 % of the women were diagnosed with low and high grade abnormalities, respectively. 12 % (53) of the cases showed HPV-related changes, whereas no suspected malignancy was found. Colposcopic-directed cervical biopsy was obtained in 228 women (~54 %) depending on the colposcopic examination findings. The most histological finding was CIN I which constitutes 48 % (110) of all biopsies. However, 25 % (58) and 9 % (20) revealed CIN II and CIN III, respectively. The glandular changes noticed in only one case (0.44 %). The treatment was planned for 130 women, a significant proportion (30.5 %) of the 426 women who referred for colposcopy. The histological examination of the biopsies showed CIN in 91 % of the cases (115), 74.8 % (86) of them had CIN II (36) or CIN III (50). In addition, the glandular changes found in two cases (1.6 %). More importantly, there was one case diagnosed with micro-invasive cervical cancer (0.79 %) and this comprises 0.23 % of our sample. CONCLUSION: In view of the size and the heterogeneity of our sample, it is difficult to recommend changing the starting age of the cervical screening programme. However, we strongly recommend to have a low threshold to offering cervical cytology to the women under 25 on clinical basis, particularly, after the recent introduction of HPV triage (outside the scope of this study), which will enable us to avoid the two main disadvantages of the early screening, namely over-diagnosis and over-treatment.

Anderson, D., T. Owen, A. Mairs, C. McMullen and A. Graham (2015). "**Barriers and motivators to participation in the Northern Ireland Breast and Cervical Screening Programmes: a qualitative study**." Eur J Cancer Care (Engl) **24**: 28-28.

Anderson, L., M. O'Rorke, J. Jamison, R. Wilson, A. Gavin and H. P. V. W. G. Members (2013). "**Prevalence of human papillomavirus in women attending cervical screening in the UK and Ireland: New data from northern Ireland and a systematic review and meta-analysis**." J Med Virol **85**(2): 295-308.

There is substantial international variation in human papillomavirus (HPV) prevalence; this study details the first report from Northern Ireland and additionally provides a systematic review and meta-analysis pooling the prevalence of high-risk (HR-HPV) subtypes among women with normal cytology in the UK and Ireland. Between February and December 2009, routine liquid based cytology (LBC) samples were collected for HPV detection (Roche Cobas (R) 4800 [PCR]) among unselected women attending for cervical cytology testing. Four electronic databases, including MEDLINE, were then searched from their inception till April 2011. A random effects meta-analysis was used to calculate a pooled HR-HPV prevalence and associated 95% confidence intervals (CI). 5,712 women, mean age 39 years (+/- SD 11.9 years; range 2064 years), were included in the analysis, of which 5,068 (88.7%), 417 (7.3%) and 72 (1.3%) had normal, low, and high-grade cytological findings, respectively. Crude HR-HPV prevalence was 13.2% (95% CI, 12.713.7) among women with normal cytology and increased with cytological grade. In meta-analysis the pooled HR-HPV prevalence among those with normal cytology was 0.12 (95% CIs, 0.100.14; 21 studies) with the highest prevalence in younger women. HPV 16 and HPV 18 specific estimates were 0.03 (95% CI, 0.020.05) and 0.01 (95% CI, 0.010.02), respectively. The findings of this Northern Ireland study and meta-analysis verify the prevalent nature of HPV infection among younger women. Reporting of the type-specific prevalence of HPV infection is relevant for evaluating the impact of future HPV immunization initiatives, particularly against HR-HPV types other than HPV 16 and 18. J. Med. Virol. 85:295308, 2013. (c) 2012 Wiley Periodicals, Inc.

Armstrong, N., V. James and M. Dixon-Woods (2012). "**The role of primary care professionals in women's experiences of cervical cancer screening: a qualitative study**." Fam Pract **29**(4): 462-466.

BACKGROUND: The UK Cervical Screening Programme, delivered mostly through primary care, commands impressive levels of public support. However, considerable evidence suggests that women find the experience of screening problematic. OBJECTIVE: To investigate this tension using women's accounts of cervical screening, with a view to informing practice to better meet their needs. METHODS: A qualitative interview study with 34 participants focussed on their experiences and understandings of cervical cancer screening in the UK. Analysis was based on the constant comparative method. RESULTS: The highly intimate and personal nature of the test is challenging, and many women report unsatisfactory experiences. Problematic issues include: embarrassment and discomfort (sometimes severe) in exposing an intimate and personal part of their body; surrendering control and finding the test painful, uncomfortable and personally threatening. Though there is an important role for primary health care professionals in easing discomfort and facilitating positive experiences, women often report feeling disappointed with how the procedure is conducted. Women suggest that practitioners' attempts to normalize the interaction and maintain a degree of detachment could have the perverse effect of making them feel more uncomfortable and that more personalization would be welcome. CONCLUSIONS: This work identifies the ways in which women may find personal engagement with cervical screening difficult and demonstrates the important role of primary care practitioners in contributing to women's experiences of the encounter. We draw on Erving Goffman's work on the 'interaction order' to explain some of the problems reported by women and to help inform good practice in primary care.

Bang, J. Y., G. Yadegarfar, M. Soljak and A. Majeed (2012). "**Primary care factors associated with cervical screening coverage in England**." J Public Health (Oxf) **34**(4): 532-538.

BACKGROUND: The National Health Service Cervical Screening Programme was established to decrease the incidence and mortality of cervical cancer in England. METHODS: To identify socioeconomic and general practice factors associated with cervical screening coverage in England, a national cross-sectional study was conducted using data on 26 497 476 female patients registered with 7970 practices in 152 English primary care trusts (PCTs). The 2008-09 data on cervical screening coverage rates from the quality and outcomes framework (QOF) database were used with data on QOF indicators, staffing levels and socioeconomic status. RESULTS: The mean cervical screening coverage rate was 78.5% at the PCT level and 83.5% at the practice level. At both levels, cervical screening coverage was significantly negatively associated with the index of multiple deprivation score, percentage of female patients aged 25-49 years and percentage of ethnic minority patients. Also, at the practice level, the percentage of female patients aged 50-64 years, overall QOF score and records and information score were significantly positively associated with cervical screening coverage. CONCLUSIONS: Cervical screening coverage was significantly lower in PCTs and practices serving higher percentages of younger-aged women, non-Caucasian individuals and those living in socioeconomic deprivation. It is therefore important to adopt strategies to improve cervical screening coverage in these groups.

Beer, H., S. Hibbitts, S. Brophy, M. A. Rahman, J. Waller and S. Paranjothy (2014). "**Does the HPV vaccination programme have implications for cervical screening programmes in the UK?**" Vaccine **32**(16): 1828-1833.

In the UK, a national HPV immunisation programme was implemented in 2008 for girls aged 12-13 years. In addition a catch-up programme was implemented for older girls up to 18 years of age from 2009 to 2011, with an uptake rate of 49.4%. Information about future uptake of cervical screening according to vaccination statistics is important in order to understand the impact of the vaccination programme and implications for a national cervical screening programme. We analysed data on a cohort of women who had been offered the HPV vaccine in the catch-up programme and were invited for cervical screening between 2010 and 2012 in Wales (n=30,882), in a record-linked database study, to describe the cervical screening uptake and clinical outcome according to HPV vaccination status. In our cohort, 48.5% (n=14,966) women had had HPV vaccination and 45.9% (n=14,164) women attended for cervical screening. Women who were unvaccinated were less likely to attend cervical screening (adjusted OR 0.58; 95% CI (0.55, 0.61)). Of those who attended for screening, 13.9% of vaccinated women had abnormal cytology reported compared to 16.7% of women who were unvaccinated. Women who lived in areas with high levels of social deprivation were less likely to be vaccinated (Quintile 5 OR 0.48 95% CI (0.45, 0.52)) or attend cervical screening (Quintile 5 OR 0.70; 95% CI (0.65, 0.75)) compared to those who lived in the least deprived areas. These data highlight the need for new strategies to address inequalities in cervical screening uptake and can inform further mathematical modelling work to clarify the impact of the HPV vaccination programme on future cervical cancer incidence.

Bennet, N. (2012). "**UK pilot of HPV primary screening for cervical cancer**." Lancet Oncology **13**(7): E288-E288.

Bergman, B. P., D. F. Mackay and J. P. Pell (2016). "**Early adoption of screening and the changing pattern of cervical cancer in UK military women: evidence from the Scottish Veterans Health Study**." J R Army Med Corps **162**(5): 379-382.

OBJECTIVE: To examine the risk of cervical cancer in a large national cohort of military veteran women followed up for up to 30 years. METHODS: Retrospective cohort study of 5235 veteran women born between 1945 and 1985, and 20 703 women with no record of service matched for age and area of residence, using Cox proportional hazard models to compare the overall risk of cervical cancer and by year of birth. RESULTS: During the follow-up period 1981-2012, there were 18 (0.34%) cases of cervical cancer in the veteran women compared with 81 (0.39%) in the non-veterans. The difference was not statistically significant overall (adjusted HR 0.95, 95% CI 0.57 to 1.59). When analysed by the year of birth, veteran women born in 1958 and earlier had a non-significantly higher risk than non-veterans (adjusted HR 1.24, 95% CI 0.68 to 2.26), while veteran women born after 1958 had a non-significant reduction in risk (adjusted HR 0.51, 95% CI 0.18 to 1.44). CONCLUSIONS: Women born after 1958 who have served in the Armed Forces are at reduced risk of cervical cancer compared with women who have never served, and compared with older veteran women. Small numbers of cases precluded statistical significance. The change in risk pattern in veteran women coincided with the introduction of cervical screening in the Armed Forces, which predated the UK national programme, and provides evidence for the long-term effectiveness of the Armed Forces' sexual health strategy. The impact of recent changes in the screening age, and of human papillomavirus immunisation, should be monitored in the future.

Blanks, R. G. (2012). "**ABC3 Part II: a review of the new criteria for evaluating cervical cytology in England**." Cytopathology **23**(6): 360-370.

The new Achievable Standards, Benchmarks for Reporting, and Criteria for Evaluating Cervical Cytopathology, 3rd edn (ABC3) includes radical changes in the criteria for evaluating cervical cytology. First, they include a new mission statement 'the objective of cervical screening is to reduce cervical cancer incidence and mortality by screening with a high sensitivity for the detection of CIN2 or worse, whilst maintaining a high specificity'. Second, the original four performance measurement criteria where laboratories were examined further if they were below the 10th or above the 90th percentile has been changed to three and laboratories are only mandatorily examined if they fall below the 5th or above the 95th percentile. The old criteria related to the percentage of samples that were inadequate, the percentage of all adequate samples reported as moderate dyskaryosis or worse (equivalent to high-grade squamous intraepithelial lesion or cancer), the percentage of adequate samples reported as mild dyskaryosis or borderline (equivalent to low-grade squamous intraepithelial lesion or atypical squamous/glandular cells) and the positive predictive value. The new criteria are percentage of inadequate samples, positive predictive value and a new measure termed referral value. These changes mean that far fewer laboratories will require mandatory examination. Third, a raft of optional performance measures have been introduced to help laboratories examine their annual statistical return to the Department of Health in comparison with other laboratories. These measures have been designed to produce a more uniform national programme, and to help laboratories decide whether they are maximizing the benefit of screening while minimizing the harm, which is the goal of all screening programmes. This review examines in detail the new criteria and explains in more detail some of the thinking behind them.

Bowring, J., R. Albrow, A. Fisher, G. Downey, J. Cullimore, J. Patnick, P. G. Walker and H. C. Kitchener (2013). "**A prospective study of human papillomavirus (HPV) testing to resolve uncertainty in colposcopy**." Cytopathology **24**(5): 309-313.

OBJECTIVE: UK colposcopy services are seeing increased workloads, a large proportion of which are follow-up appointments. The English Cervical Screening Programme HPV Special Interest Group identified five subcategories of colposcopy clinic patients who often require prolonged follow-up regimes for low-grade abnormalities. Human papillomavirus (HPV) testing has a high negative predictive value, meaning that HPV-negative women are at very low risk of underlying disease. Our objectives were to quantify the number of HPV-negative women in each study subcategory and to evaluate the number who could potentially be discharged from colposcopy on the basis of their results. METHODS: Four colposcopy clinics prospectively identified women according to five categories over 12 months. All women underwent cytological testing and high-risk HPV (hrHPV) testing using the Hybrid Capture 2 test. Management outcomes and decisions based on a knowledge of the HPV status were recorded. RESULTS: Data available on 755 women showed that 422/755 (55.9%) and 260/755 (34.4%) had persistent cervical intraepithelial neoplasia grade 1 (CIN1) (Category 1) or a minor abnormality following treatment (Category 2), respectively. In Categories 1 and 2, 51.7% and 60.2%, respectively, were hrHPV negative. The rates with biopsies of CIN2 or worse (CIN2+) across the two categories were 3/355 (0.8%) and 21/291 (7.0%) for hrHPV-negative and hrHPV-positive women, respectively. CONCLUSION: The incorporation of hrHPV testing within organized cervical screening programmes has been widely accepted. hrHPV testing for the clinical scenarios outlined in this study detects women who are hrHPV negative and therefore at low risk of underlying disease, potentially reducing anxiety and inconvenience for women and costs to colposcopy services.

Bryant, E. (2012). "**The impact of policy and screening on cervical cancer in England**." Br J Nurs **21**(4): S4, s6-10.

There has been a significant statistical decrease in the incidence of cervical cancer since screening programmes have been introduced. This article will explore and evaluate the impact of the Cancer Reform Strategy on cervical screening in England, which preceded the Government's policy for cancer care announced in January 2011. The Strategy raised the initial age of screening from 20 to 25 years of age. This left a group of the population who could not access screening while also not being eligible for vaccines against cervical cancer. Although this caused concern for many people, the media coverage and reaction to the human papilloma virus (HPV) vaccine and the death of Jade Goody, for example, encouraged women to consider cervical screening. The barriers to screening have been identified but overall the Cancer Reform Strategy was found have a positive impact both economically and socially. The Strategy has led the way for the Government's policy for cancer care, which needs to continue achieving the same positive outcomes.

Cadman, L., L. Ashdown-Barr, J. Waller and A. Szarewski (2015). "**Attitudes towards cytology and human papillomavirus self-sample collection for cervical screening among Hindu women in London, UK: a mixed methods study**." J Fam Plann Reprod Health Care **41**(1): 38-47.

OBJECTIVES: To explore the attitudes, views and understanding of women attending a Hindu temple in London, UK towards cervical screening, human papillomavirus (HPV) testing and two HPV self-sample collection devices: the Dacron swab and Evalyn((R)) brush. METHODS: A mixed methods design comprising a survey and four focus groups was adopted. Focus group discussions were recorded and transcribed verbatim and explored using thematic framework analysis. RESULTS: A total of 185 Hindu women completed surveys and 23 attended focus groups. Of the respondents 75% aged 25-64 years reported having cervical screening within the last 5 years; 85% had attended college or university. Familiar barriers to attendance for screening were identified: fear of pain and the test result, embarrassment, screener's attitude, inconvenient appointment times and difficulty with child care. Additional barriers cited included age and country of birth, with older and Indian-born women thought to be less likely to attend for screening. Self-collected sampling had a mixed reception. Women were not confident that their sample would be as good as a clinician sample and expressed concern about the impact that a positive HPV result might have on their relationships. CONCLUSIONS: Screening attendance in this highly educated group of Hindu women was slightly lower than in the general population (75% of women aged 25-64 years had been screened in the last 5 years compared with 79% in England as a whole). Familiar barriers to screening were identified. Women felt able to collect their own sample for HPV testing with a Dacron swab but lacked confidence that it would be as good as that obtained by a clinician.

Cadman, L., J. Waller, L. Ashdown-Barr and A. Szarewski (2012). "**Barriers to cervical screening in women who have experienced sexual abuse: an exploratory study**." J Fam Plann Reprod Health Care **38**(4): 214-220.

OBJECTIVES: To explore self-reported cervical screening history and barriers to attendance among women who have been sexually abused and to identify measures to improve the experience of cervical screening for these women. METHODS: Women visiting the website of the National Association for People Abused in Childhood (NAPAC), who had been sexually abused, were invited to complete a survey of their views and experiences of cervical screening. This included closed questions on demographic characteristics and cervical screening

attendance, open questions on barriers to screening, and the opportunity to submit suggestions to improve this experience for women who have been sexually abused. Content analysis was used to code responses to the open questions. Four women also participated in a discussion group. RESULTS: Overall, 135 women completed the closed questions and 124 provided open-ended responses. 77.5% of responding women who were eligible for cervical screening in England had ever attended, 48.5% at least once in the previous 5 years, but 42.1% of women aged 25-49 within 3 years. A total of nine higher order themes were identified related to barriers to screening, one related to intention to attend screening and five related to suggestions to improve screening. CONCLUSIONS: This study supports the idea that women who have experienced sexual abuse are less likely to attend for regular cervical screening, with under half screened in the last 5 years compared to the National Health Service Cervical Screening Programme figure of 78.6%. Suggestions to improve the experience for abused women focused on communication, safety, trust and sharing control. Further research in this area is warranted to ensure that this at-risk population is appropriately served by cervical screening.

Casey, G. M., B. Morris, M. Burnell, A. Parberry, N. Singh and A. N. Rosenthal (2013). "**Celebrities and screening: a measurable impact on high-grade cervical neoplasia diagnosis from the 'Jade Goody effect' in the UK**." Br J Cancer **109**(5): 1192-1197.

BACKGROUND: The celebrity Jade Goody's cervical cancer diagnosis was associated with increased UK cervical screening attendance. We wanted to establish if there was an increase in high-grade (HG) cervical neoplasia diagnoses, and if so, what the characteristics of the women with HG disease were. METHODS: We analysed prospective data on 3233 consecutive colposcopy referrals in North East London, UK, from 01 April 2005 to 30 June 2010. Characteristics and outcomes of pre- and post-Goody cohorts were compared. RESULTS: Goody's diagnosis was associated with an increased incidence of colposcopy referrals in all subsequent annual quarters (incidence rate ratio (IRR) 1.3-1.9, P<0.002-P<0.0005) and increased HG disease diagnoses in the fourth quarter 2008/2009 (IRR 1.3, P=0.05) and first quarter 2009/2010 (IRR 1.3, P=0.07). We observed 1.90-fold (CI: 1.06-3.39), 2.06 (CI: 1.13-3.76) and 2.13-fold (CI: 1.07-4.25) respective increases in the odds of HG disease women being screening-naive in the first and second quarter 2009/2010, and the first quarter 2010/2011 (P<0.04, P<0.02 and P<0.04, respectively). There was a 2.23-fold increase in the odds of screening-naive HG disease women being symptomatic post-Goody's diagnosis (P=0.023). The age distributions of the pre- and post-Goody cohorts did not differ in any study group. CONCLUSION: Continued publicity about celebrities' diagnoses might encourage screening in at-risk populations.

Castanon, A., R. Landy, J. Cuzick and P. Sasieni (2014). "**Cervical screening at age 50-64 years and the risk of cervical cancer at age 65 years and older: population-based case control study**." PLoS Med **11**(1): e1001585.

BACKGROUND: There is little consensus, and minimal evidence, regarding the age at which to stop cervical screening. We studied the association between screening at age 50-64 y and cervical cancer at age 65-83 y. METHODS AND FINDINGS: Cases were women (n = 1,341) diagnosed with cervical cancer at age 65-83 y between 1 April 2007 and 31 March 2012 in England and Wales; age-matched controls (n = 2,646) were randomly selected from population registers. Screening details from 1988 onwards were extracted from national databases. We calculated the odds ratios (OR) for different screening histories and subsequent cervical cancer. Women with adequate negative screening at age 65 y (288 cases, 1,395 controls) were at lowest

risk of cervical cancer (20-y risk: 8 cancers per 10,000 women) compared with those (532 cases, 429 controls) not screened at age 50-64 y (20-y risk: 49 cancers per 10,000 women, with OR = 0.16, 95% CI 0.13-0.19). ORs depended on the age mix of women because of the weakening association with time since last screen: OR = 0.11, 95% CI 0.08-0.14 at 2.5 to 7.5 y since last screen; OR = 0.27, 95% CI 0.20-0.36 at 12.5 to 17.5 y since last screen. Screening at least every 5.5 y between the ages 50 and 64 y was associated with a 75% lower risk of cervical cancer between the ages 65 and 79 y (OR = 0.25, 95% CI 0.21-0.30), and the attributable risk was such that in the absence of screening, cervical cancer rates in women aged 65+ would have been 2.4 (95% CI 2.1-2.7) times higher. In women aged 80-83 y the association was weaker (OR = 0.49, 95% CI 0.28-0.83) than in those aged 65-69 y (OR = 0.12, 95% CI 0.09-0.17). This study was limited by an absence of data on confounding factors; additionally, findings based on cytology may not generalise to human papillomavirus testing. CONCLUSIONS: Women with adequate negative screening at age 50-64 y had one-sixth of the risk of cervical cancer at age 65-83 y compared with women who were not screened. Stopping screening between ages 60 and 69 y in women with adequate negative screening seems sensible, but further screening may be justifiable as life expectancy increases.

Castanon, A., R. Landy and P. Sasieni (2013). "**How much could primary human papillomavirus testing reduce cervical cancer incidence and morbidity?**" J Med Screen **20**(2): 99-103.

Human papillomavirus (HPV) testing is being considered as the primary screening test for cervical cancer in England, rather than the currently used cytology test. We aimed to estimate the impact of primary HPV testing on incidence and morbidity of cervical cancer in England by estimating the proportion of cervical cancer diagnosed within 6 years of a negative cytology. We used a population-based case-control study of prospectively recorded data on cervical screening in England between 1988 and 2012, including 8774 women with invasive cervical cancer aged 25 to 64 and 17,341 controls. We used incidence rates in 2010 to estimate absolute risks. We found that 38.8% of all women with cervical cancer had a negative test within 6 years of diagnosis. Assuming HPV testing is 95% sensitive for cancers that would develop over the next 6 years but were missed by cytology, and that 4.3% of those diagnosed by cytology would be missed by HPV testing, we estimate that a maximum of 32.6% of current cases in women invited for screening aged 25 to 64 could be prevented. This translates to a reduction in the rate of cervical cancer in this age group of 4.2 per 100,000 women per year in England, equivalent to 587 cancers.

Castanon, A., R. Landy and P. Sasieni (2017). "**By how much could screening by primary human papillomavirus testing reduce cervical cancer incidence in England?**" J Med Screen **24**(2): 110-112.

Objective The replacement of cytology with human papillomavirus testing as the primary cervical screening test in England is imminent. In light of newly available evidence, we revised our previous estimates of the likely impact of primary human papillomavirus testing on incidence of cervical cancer. Method and results Using screening data on women aged 25-64 diagnosed with cervical cancer in England between 1988 and 2012, we previously reported that 38.8% had a negative test six months to six years prior to diagnosis. However, not all of these cancers would be prevented by human papillomavirus testing: for 1.0% the human papillomavirus positive test would come too late (within 18 months of diagnosis) to make a difference; 7.6% will have a negative human papillomavirus test (based on 79.9% sensitivity of human papillomavirus testing in cytology negative women); and 2.0% will develop cancer despite a positive human papillomavirus test. Additionally, we estimate that some women (equivalent to 4.3% of current incidence) whose cancers are currently prevented by cytology-

based screening will have a false-negative human papillomavirus test. Conclusion Overall, we estimate that 23.9% (95% CI: 19.3-27.6%) of current cases in women invited for screening could be prevented. Based on 2013 cancer incidence statistics, absolute numbers could be reduced by 487 (95% CI 394 to 563) or 3.4 (95% CI 2.8 to 4.0) per 100,000 women per year.

Chorley, A. J., L. A. Marlow, A. S. Forster, J. B. Haddrell and J. Waller (2017). "**Experiences of cervical screening and barriers to participation in the context of an organised programme: a systematic review and thematic synthesis**." Psychooncology **26**(2): 161-172.

OBJECTIVE: As uptake of cervical screening continues to decline, this systematic review synthesises the qualitative literature on women's perceptions and experiences of cervical screening in the context of an organised call-recall programme, in order to understand the barriers to informed uptake. METHODS: We searched nine databases for English language peer-reviewed publications reporting on qualitative data from screening-eligible women, exploring barriers to cervical screening in countries that offer a nationally organised call-recall programme. Evidence was integrated using thematic synthesis. RESULTS: Thirty-nine papers from the UK, Australia, Sweden and Korea were included. The majority of participants had attended screening at least once. Two broad themes were identified: (a) should I go for screening? and (b) screening is a big deal. In considering whether to attend, women discussed the personal relevance and value of screening. Women who had previously attended described how it was a big deal, physically and emotionally, and the varied threats that screening presents. Practical barriers affected whether women translated screening intentions into action. CONCLUSIONS: The variation in women's understanding and perceptions of cervical screening suggests that interventions tailored to decisional stage may be of value in increasing engagement with the invitation and uptake of screening in those who wish to take part. There is also a need for further research with women who have never attended screening, especially those who remain unaware or unengaged, as their perspectives are lacking in the existing literature. (c) 2016 The Authors. Psycho-Oncology Published by John Wiley & Sons Ltd.

Clement, K. M. and D. Mansour (2013). "**Invasive cancer of the cervix: does the UK National Health Service screening programme fail due to patients' non-attendance?**" Eur J Gynaecol Oncol **34**(1): 28-30.

The UK National Health Service (NHS) cervical screening programme aims to prevent invasive cancer of the cervix, yet this programme fails in some women. Women diagnosed with cancer of the cervix at a colposcopy unit in the North East of England between April 1, 1997 and December 31, 2004 had cervical cytology histories classified. Thirty-seven cases were identified (median age 37 years; range 22-72 years). At six months before diagnosis, 24.3% had never undergone cytology screening (38.4% Stage IB+, 12.5% Stage IA). In addition, 59.5% of all cases were under-screened (when using criteria that included screening was 'up to date' if less than five years had elapsed between last negative test result and their diagnosis). Women in this case series failed to attend regular cervical screening, with those never attending screening more likely to present with advanced cancer.

Crawford, J., F. Ahmad, D. Beaton and A. S. Bierman (2016). "**Cancer screening behaviours among South Asian immigrants in the UK, US and Canada: a scoping study**." Health Soc Care Community **24**(2): 123-153.

South Asian (SA) immigrants settled in the United Kingdom (UK) and North America [United States (US) and Canada] have low screening rates for breast, cervical and colorectal cancers. Incidence rates of these cancers increase among SA immigrants after migration, becoming

similar to rates in non-Asian native populations. However, there are disparities in cancer screening, with low cancer screening uptake in this population. We conducted a scoping study using Arksey & O'Malley's framework to examine cancer screening literature on SA immigrants residing in the UK, US and Canada. Eight electronic databases, key journals and reference lists were searched for English language studies and reports. Of 1465 identified references, 70 studies from 1994 to November 2014 were included: 63% on breast or cervical cancer screening or both; 10% examined colorectal cancer screening only; 16% explored health promotion/service provision; 8% studied breast, cervical and colorectal cancer screening; and 3% examined breast and colorectal cancer screening. A thematic analysis uncovered four dominant themes: (i) beliefs and attitudes towards cancer and screening included centrality of family, holistic healthcare, fatalism, screening as unnecessary and emotion-laden perceptions; (ii) lack of knowledge of cancer and screening related to not having heard about cancer and its causes, or lack of awareness of screening, its rationale and/or how to access services; (iii) barriers to access including individual and structural barriers; and (iv) gender differences in screening uptake and their associated factors. Findings offer insights that can be used to develop culturally sensitive interventions to minimise barriers and increase cancer screening uptake in these communities, while recognising the diversity within the SA culture. Further research is required to address the gap in colorectal cancer screening literature to more fully understand SA immigrants' perspectives, as well as research to better understand gender-specific factors that influence screening uptake.

Cruickshank, M. E., J. Pan, S. C. Cotton, K. Kavanagh, C. Robertson, K. Cuschieri, H. Cubie, T. Palmer and K. G. Pollock (2017). "**Reduction in colposcopy workload and associated clinical activity following human papillomavirus (HPV) catch-up vaccination programme in Scotland: an ecological study**." Bjog **124**(9): 1386-1393.

OBJECTIVE: To measure patterns of clinical activity at colposcopy before and after vaccinated women entered the Scottish Cervical Screening Programme (SCSP). DESIGN: Population-based observational study using nationally collected data. SETTING: Scottish colposcopy clinics. SAMPLE: All women with a date of birth on or after 1 January 1985 who attended colposcopy in Scotland between 2008 and 2014. METHODS: Routinely collected data from the Scottish National Colposcopy Clinical Information Audit System (NCCIAS) were extracted, including: referral criteria, referral cervical cytology, colposcopic findings, clinical procedures, and histology results. Analysis was restricted to those referred to colposcopy at age 20 or 21 years. MAIN OUTCOME MEASURES: Referral criteria, positive predictive value of colposcopy, default rates, and rates of cervical biopsies and treatments. RESULTS: A total of 7372 women referred for colposcopy at age 20 or 21 years were identified. There was a downward trend in the proportion of those referred with abnormal cytology (2008/9, 91.0%; 2013/14, 90.3%; linear trend P = 0.03). Women were less likely to have diagnostic or therapeutic interventions. The proportion with no biopsy (2008/9, 19.5%; 2013/14, 26.9%; linear trend P < 0.0001) and no treatment (2008/9, 74.9%; 2013/14, 91.8%; linear trend P < 0.0001) increased over the period of observation. CONCLUSIONS: A reduction in clinical activity related to abnormal screening referrals is likely to be associated with the human papillomavirus (HPV) catch-up immunisation programme. Referral criteria and the service provision of colposcopy needs to be planned carefully, taking account of the increasing number of women who have been immunised against HPV that will be entering cervical screening programmes worldwide. TWEETABLE ABSTRACT: Colposcopy referral criteria and service planning need attention following HPV immunisation programme.

Cubie, H. A. and K. Cuschieri (2013). "**Understanding HPV tests and their appropriate applications**." Cytopathology **24**(5): 289-308.

Greater understanding of the role played by human papillomavirus (HPV) in the causation of disease has led to the development of an increasing number of HPV tests with different characteristics. The bewildering choice facing healthcare professionals and providers is daunting. Clearly, HPV testing is no longer simply of research interest, but can provide information that can be used for individual patient management and at the population level for cervical screening and vaccine surveillance. This review aims to provide the background to the development of HPV tests, to explain the different technologies and to discuss the challenges of the application of these optimally in the varied contexts of disease management. Few HPV tests are approved for clinical use and it is important that clinicians understand which test can be utilized, in what circumstances, with what specimens and the meaning of the report issued. HPV testing is no longer applicable only to cervical disease, and we have suggested additional areas, such as the oropharynx, in which HPV testing services might be implemented in the near future. New tests will continue to emerge and we have identified some of the indirect measures of HPV activity, or biomarkers, that could help in the risk stratification of HPV infection and associated disease. The challenges relating to the optimal application of the various HPV technologies are compounded by the lack of evidence regarding their performance in vaccinated populations. Currently published work, including modelling studies, has been undertaken in non-immunized populations. We therefore end by addressing the issues regarding appropriate strategies and tests for immunized populations.

Curmi, C., K. Peters and Y. Salamonson (2014). "**Lesbians' attitudes and practices of cervical cancer screening: a qualitative study**." BMC Womens Health **14**: 153.

BACKGROUND: Cervical cancer is the third most prevalent cancer in women, and since the introduction of the Papanicolaou test (Pap test or Pap smear), the incidence of cervical cancer and mortality rates worldwide have declined substantially. However significant disparities have been identified between the cervical screening rates of heterosexual and lesbian women. This study explores the attitudes and practices that lesbians have towards cervical cancer screening and aims to identify why such disparities occur. METHODS: A qualitative methodology based on feminist perspectives was used to collect narrative data from lesbians about their attitudes and practices of cervical screening through the use of semi structured interviews. Nine women who self-identified as lesbian that were living in New South Wales were recruited for the study. Interviews were digitally recorded and transcribed verbatim. Data were analysed using a thematic analysis approach. RESULTS: Four main themes emerged from the data namely: Encountering cervical cancer: "my friends had some early cancer cells detected", Misconceptions related to risk: "I am a lesbian I don't need one", Imposed screening: "It's a requirement of IVF treatment" and, Promoting cervical screening: "I think it should be spoken about in schools". CONCLUSIONS: Consistent with the literature, the findings show that the majority of these women do not undertake cervical screening at the recommended rate. This study highlights the multiple and complex issues related to cervical cancer screening for lesbians, mainly through misconceptions and underestimation of risk. Specific and targeted educational and promotional strategies are required for both lesbians and health professionals to enhance cervical cancer screening rates for lesbians in Australia.

Curmi, C., K. Peters and Y. Salamonson (2016). "**Barriers to cervical cancer screening experienced by**

lesbian women: a qualitative study." J Clin Nurs **25**(23-24): 3643-3651.

AIMS AND OBJECTIVES: To provide deeper insights into the experiences of lesbian women in accessing cervical cancer screening and to inform strategies to increase the uptake of these services for this group of women. BACKGROUND: Lesbian women continue to face significant health disparities and are at increased risk for specific medical conditions. With cervical cancer being largely a preventable disease, early detection through the Papanicolaou test is crucial, as it enables treatment to commence early and limit the progression of the disease. Although the rates of cervical abnormalities among lesbian women are similar to that of the general population, lesbian women are less likely to have regular cervical screening. The reasons for this are largely unknown and there is a paucity of research that explores cervical cancer screening in lesbian women. DESIGN: Qualitative descriptive design. METHODS: Participants (n = 9) were recruited via media release and those living in New South Wales who self-identified as lesbian, meeting the inclusion criteria were recruited for the study. Semi-structured, face to face and telephone interviews were used to obtain narrative data from lesbian women on their experiences of cervical screening. RESULTS: Three main themes emerged from the data: 'Lack of opportunistic screening'; 'Fear of penetration' and 'Encountering heterosexism and discrimination'. CONCLUSIONS: This current study builds on existing knowledge and further, has identified issues that have not been previously raised in the literature. New findings from this study highlight participants' fear of penetration, and stigma associated with accessing information, as substantial barriers to cervical screening. RELEVANCE TO CLINICAL PRACTICE: This study's findings can guide future research and highlight possibilities for specific strategies to reduce health disparities among lesbian women.

Cuschieri, K., K. Kavanagh, K. Sinka, C. Robertson, H. Cubie, C. Moore and M. Donaghy (2013). "**Effect of HPV assay choice on perceived prevalence in a population-based sample**." Diagn Mol Pathol **22**(2): 85-90.

Human papillomavirus (HPV) immunization programs clearly have considerable potential to reduce HPV-associated disease; they are also resource-intense; so, it is essential that their effectiveness is determined accurately and in a timely way. Measuring circulating HPV types in a population can provide an early measure of vaccine impact. We assessed the impact of HPV assay on the observed population prevalence of HPV in women who provided samples as part of a National HPV Immunisation Surveillance Exercise. A total of 1145 liquid-based cytology samples, 326 self-taken swabs, and 371 urine samples were tested with a line-blot assay (the Digene reverse hybridization HPV genotyping assay) and a luminex-based assay (the Mulitmetrix HPV genotyping assay). Assay agreement was determined for the different sample types. Positivity (according to assay) was compared at different levels ranging from positive for HPV 16 and/or 18 to positive for any one of the 18 HPV types common to both assays. The luminex assay consistently detected a higher prevalence of HPV--up to 10% for HPV types common to both assays. In addition, disagreement for HPV 16 and/or 18 was observed in around 9% of the overall sample, with an associated kappa score of 0.74. These data indicate that assay choice has a significant impact on observed prevalence of HPV, including vaccine types. The impact of any change of assay during longitudinal surveillance programs should thus be taken into account to avoid confounding the assessment of any vaccine-induced changes.

Davies, O., S. Rajamanoharan and T. Balachandran (2015). "**Cervical screening in HIV-positive women in the East of England: recent CD4 as the predictive risk factor**." Int J STD AIDS **26**(13): 945-950.

This study examines the relationship between CD4 count and cervical cytological abnormality in

HIV-positive women attending two district general hospital genitourinary medicine clinics in the East of England. It aims to determine whether the rate of cervical cytological abnormalities differs in HIV-positive women with CD4 count >350 cells/microl and those with CD4 count </=350 cells/microl; and to compare the rates of abnormalities with that of the general population. We retrospectively reviewed data from a cross-sectional audit undertaken between December 2010 and December 2011 and analysed them using multivariable statistics. There was a significant association between recent CD4 count </=350 cells/microl and cervical cytological abnormality ($p < 0.001$). A total of 6.3% of women with recent CD4 counts >350 cells/microl had abnormal cervical smear results, compared with 6.6% of the general population in the screening period 2010-11 and 7.2% of the general population in the screening period 2009-10. In our study population of women with recent CD4 counts >350 cells/microl, the proportions of mild, moderate and severe dysplasia were also similar to national figures. This raises important questions about the cost effectiveness of blanket annual screening for HIV-positive women.

Douglas, E., J. Waller, S. W. Duffy and J. Wardle (2016). "**Socioeconomic inequalities in breast and cervical screening coverage in England: are we closing the gap?**" J Med Screen **23**(2): 98-103.

OBJECTIVE: Health policy in the UK is committed to tackling inequalities in cancer screening participation. We examined whether socioeconomic inequalities in breast and cervical cancer screening participation in England have reduced over five years. METHODS: Cross-sectional analyses compared cervical and breast screening coverage between 2007/8 and 2012/13 in Primary Care Trusts (PCTs) in England in relation to area-level income deprivation. RESULTS: At the start and the end of this five year period, there were socioeconomic inequalities in screening coverage for breast and cervical screening. Inequalities were highest for breast screening. Over time, the coverage gap between the highest and lowest quintiles of income deprivation significantly reduced for breast screening (from 12.3 to 8.3 percentage points), but not for cervical screening (5.3 to 4.9 percentage points). CONCLUSIONS: Efforts to reduce screening inequalities appear to have resulted in a significant improvement in equitable delivery of breast screening, although not of cervical screening. More work is needed to understand the differences, and see whether broader lessons can be learned from the reduction of inequalities in breast screening participation.

Edelman, N. L., H. Patel, A. Glasper and L. Bogen-Johnston (2013). "**Understanding barriers to sexual health service access among substance-misusing women on the South East coast of England**." J Fam Plann Reprod Health Care **39**(4): 258-263.

OBJECTIVES: Evidence suggests substance-misusing women (SMW) experience disproportionate sexual health morbidity and poor uptake of interventions including contraception and cervical screening, yet there has been little investigation of sexual health service access issues for this population. METHODS: Twenty women with problem drug use in Hastings in South East England, UK participated in a one-to-one interview with a researcher to explore experiences and beliefs surrounding access to a range of sexual health service interventions. Transcripts were open-coded and themes were elicited and organised concerning barriers to access. RESULTS: Drug-use lifestyles, trauma and low self-worth framed the lives of SMW and hindered sexual health service access through: depleted practical and emotional resources to enable attendance; high perceived emotional cost of discussing sexual histories, and coping with tests and unfavourable results; and low anticipated value of sexual health interventions due to low perception and minimisation of risk and perceived incompatibility between drug use and sexual well-being. CONCLUSIONS: A range of practical, social and emotional barriers to sexual health service access

exist for this population, presenting a context from within which use of services may come at considerable personal cost to SMW. Interventions addressing anticipated stigma and emotional, hygiene and fiscal concerns are warranted for this population.

Ekechi, C., A. Olaitan, R. Ellis, J. Koris, A. Amajuoyi and L. A. Marlow (2014). "**Knowledge of cervical cancer and attendance at cervical cancer screening: a survey of Black women in London**." BMC Public Health **14**: 1096.

BACKGROUND: Women from ethnic minority backgrounds are less likely to attend cervical screening, but further understanding of ethnic inequalities in cervical screening uptake is yet to be established. This study aimed to explore the socio-demographic and ethnicity-related predictors of cervical cancer knowledge, cervical screening attendance and reasons for non-attendance among Black women in London. METHODS: A questionnaire was completed by women attending Black and ethnic hair and beauty specialists in London between February and April 2013. A stratified sampling frame was used to identify Black hair specialists in London subdivisions with >10% Black population (including UK and foreign-born). Fifty-nine salons participated. Knowledge of cervical cancer risk factors and symptoms, self-reported screening attendance and reasons for non-attendance at cervical screening were assessed. RESULTS: Questionnaires were completed by 937 Black women aged 18-78, describing themselves as being predominantly from African or Caribbean backgrounds (response rate 26.5%). Higher educational qualifications ($p < .001$) and being born in the UK ($p = .011$) were associated with greater risk factor knowledge. Older age was associated with greater symptom knowledge ($p < .001$). Being younger, single, African (compared to Caribbean) and attending religious services more frequently were associated with being overdue for screening. Women who had migrated to the UK more than 10 years ago were less likely to be overdue than those born in the UK. Of those overdue for screening who endorsed a barrier (67/133), 'I meant to go but didn't get round to it' (28%), fear of the test procedure (18%) and low risk perception (18%) were the most common barriers. CONCLUSIONS: Ethnicity, migration and religiosity play a role in predicting cervical screening attendance among women from Black backgrounds. African women, those born in the UK and those who regularly attend church are most likely to put off attending. Additional research is needed to explore the attitudes, experiences and beliefs that explain why these groups might differ.

Elliot, G., D. Kaur, R. Chenoy, K. Rao, J. Saravanamuthu and V. Oon (2016). "**Are the UK cervical screening guidelines suitable for women aged over 50 years? The incidence of cervical intraepithelial neoplasia (CIN) in women over 50 in a London university hospital**." Bjog-an International Journal of Obstetrics and Gynaecology **123**: 105-105.

Flannelly, G. M., M. T. Mooney, G. M. Greehy, E. B. Keogh, S. A. McNally and P. E. Fitzpatrick (2016). "**Establishment of a national cervical screening programme in Ireland, CervicalCheck: the first 6 years**." Eur J Cancer Prev.

The national cervical screening programme, CervicalCheck, commenced in Ireland in 2008. Free cervical smear tests are offered to over 1.2 million women aged 25-60 every 3 (aged 25-44) and 5 (aged 45-60) years. The purpose of this paper is to highlight the achievements and document the experience of the first 6 years of a new cervical screening programme. Data were extracted from the programme screening register and colposcopy management systems. SAS, version 9.4 was used for statistical analysis. Over 1.98 million smear tests were performed in over 1 million women during the first 6 years of the programme. Overall 5-year coverage at the end of the

sixth year was 77.0%, where coverage is presented for the target population of women aged 25-60 years and is adjusted for hysterectomy rates. The numbers of women attending colposcopy increased significantly from 10 000 new patients attending for the first time in the first year to a peak of almost 17 500 in the third year. Increased capacity in colposcopy has delivered significant improvements in waiting times; the percentage of women referred to colposcopy offered an appointment within 8 weeks increased from 41.5% in year 1 to 93.4% in year 4 and has remained above the greater than 90% standard thereafter. The number of biopsies increased markedly, with 33 768 women being diagnosed with cervical intraepithelial neoplasia-grade 2 (CIN2), CIN3 or adenocarcinoma in situ and 860 being diagnosed with invasive cancer by the end of the sixth year. Lessons from CervicalCheck include the importance of capacity planning in programme delivery. The programme continues to evolve, particularly with the increased usage of human papillomavirus testing and planning for future testing of the human papillomavirus (HPV)-vaccinated cohort.

Flynn, H. and P. Lewis (2013). "**Rational care or rationing care? The case of cervical screening across the United Kingdom**." Health Policy **112**(3): 197-201.

In 2003, The National Health Service Cervical Screening Programme (NHSCSP) in England modified its recommendation by increasing the age at which to begin screening from 20 to 25. This was on the grounds that normal changes in the cervix before the age of 25 are often identified during screening as being abnormal, resulting in many young women receiving unnecessary treatment at both a significant psychological cost to the patient and a financial cost to the service. In 2011, the cervical screening programme in Northern Ireland was also amended followed closely by Scotland in late 2012. Some 10 years later, Wales finally altered cervical screening policy in January 2013 and now invite women for an initial screen at the age of 25, in line with the rest of the United Kingdom (UK). The withdrawal of cervical screening from 20 to 24 years in England was the first occasion globally, where a population cancer screening programme was withdrawn. Although the changes in England were perceived by some as "rational care" - as they encourage utilisation of beneficial services while discouraging use of those that may lead to more harms than benefits, many people also believe them to be "rationing care". In fact, even now, a decade on from the policy alterations in England, people are still vociferously exhibiting their discontent at the decision; exacerbated by national media headlines such as: "Denying young women smear tests is a disgrace". Yet with recent, rather alarming analysis of trends in England suggesting a rise in the incidence of cervical cancer in young women, it seems of great public health interest to consider whether such a rise is attributable to reduced cervical screening activity and reflect on whether the decision to alter cervical screening policy for those under the age of 25 was, in fact, a rational and correct decision.

Foran, C. and A. Brennan (2015). "**Prevention and early detection of cervical cancer in the UK**." Br J Nurs **24**(10): S22-24, s26, s28-29.

This literature review explores the prevention and early detection of cervical cancer in the UK. Current findings indicate that there is a risk for women under the age of 25 years, who may develop cervical cancer. There appears to be a gap in UK policy that may overlook these women, who are beneath the age for initial screening but exceed the age for vaccination. Despite the inextricable link between sexual activity and cervical cancer, cervical screening and sexual health promotion still appear to be disjointed, and the role of a sexually transmitted infection leading to the development of cervical cancer has not been emphasised enough in public health

messages. Further training should be provided and its impact monitored, designed to address this anomaly in health promotion. There are many barriers to health promotion including, those of a societal, cultural and religious nature. Additional research is required to ascertain the types of educational and awareness interventions that would be most effective in promoting and encouraging positive sexual behaviours among young people, and to explore how these might be successfully implemented.

Franceschi, S. and S. Vaccarella (2015). "**Beral's 1974 paper: A step towards universal prevention of cervical cancer**." Cancer Epidemiol **39**(6): 1152-1156.

In 1974, Valerie Beral published a landmark paper on the sexually transmitted origin of cervical cancer (CC) using statistics routinely available in the United Kingdom (UK). Among women born between 1902 and 1947, CC mortality rates correlated remarkably well with the incidence rates of gonorrhoea when they were 20 years old and both were highest among women born after 1940. Hence, if CC prevention and treatment had remained unchanged, the youngest generations of women would have experienced a high risk of CC death as they grew older. Fortunately, progress in CC prevention has helped avoid this scenario. The adverse consequences of the "sexual revolution" were greatly mitigated in the UK and other high-resource countries by the implementation of high quality cytology-based CC screening. An age-period-cohort analysis suggests that >30,000 cases or approximately 35% of expected CC cases may have been prevented by screening programmes in the UK between 1983 and 2007 and this percentage has been steadily increasing. In addition, the discovery of the causal role of HPV is reshaping primary and secondary prevention of CC. Cheaper HPV tests are becoming available and HPV-based primary screening may at last facilitate CC screening in low-resource countries. In the long-term, however, HPV vaccination, which has already been adopted by many countries, represents the best hope for preventing CC and overcoming socio-economic differences in CC risk within and across countries. The additional elucidation of HPV cofactors to which Beral has greatly contributed may also help control HPV infection in unvaccinated women.

Gubbala, K., A. Laios, T. K. Madhuri, P. Pathiraja, K. Haldar and S. Kehoe (2017). "**Results from Survey to Assess Current Trends in Surgical Practice in the Management of Women with Early Stage Cervical Cancer within the BGCS Community with an Emphasis on Routine Frozen Section Examination**." Int J Surg Oncol **2017**: 2962450.

In the UK, more than 3,200 new cases of cervical cancer are diagnosed each year. Early stage cervical cancer (IA2-IB1) treatment comprises central surgery mainly in the form of radical hysterectomy or fertility sparing surgery including trachelectomy as well as systematic pelvic lymphadenectomy to detect metastases and adjust treatment accordingly. Given the variation in determining the lymph node (LN) status, a major prognosticator, we reviewed the current UK practice of LN assessment in women undergoing surgery for early cervical cancer. A 7-question, web-based survey, screened by the BGCS committee, was circulated amongst BGCS members. The overall response rate was 51%. Only 12.5% of the respondents routinely performed frozen section examination (FSE); the main reasons for not doing FSE were the pressure on theatre time (54.5%) and the lack of available facilities (48.5%). When positive pelvic nodal disease was detected, in 21 out of 50 (42%) the planned radical hysterectomy (RH) was aborted. More than 70% of the respondents routinely performed RH without any prior resort to pelvic lymphadenectomy. Pretreatment surgical para-aortic LN assessment was performed by 20% of the respondents. The survey confirms the diversity of the UK practice patterns in the surgical

treatment of early cervical cancer.

H, C. K., K. Canfell, C. Gilham, A. Sargent, C. Roberts, M. Desai and J. Peto (2014). "**The clinical effectiveness and cost-effectiveness of primary human papillomavirus cervical screening in England: extended follow-up of the ARTISTIC randomised trial cohort through three screening rounds**." Health Technol Assess **18**(23): 1-196.

BACKGROUND: The ARTISTIC (A Randomised Trial In Screening To Improve Cytology) trial originally reported after two rounds of primary cervical screening with human papillomavirus (HPV). Extended follow-up of the randomised trial cohort through a third round could provide valuable insight into the duration of protection of a negative HPV test, which could allow extended screening intervals. If HPV primary screening is to be considered in the national programme, then determining its cost-effectiveness is key, and a detailed economic analysis using ARTISTIC data is needed. AIMS/OBJECTIVES: (1) To determine the round 3 and cumulative rates of cervical intraepithelial neoplasia (CIN) grade 2 or worse (2+) and CIN grade 3 or worse (CIN3+) between the revealed and concealed arms of ARTISTIC after three screening rounds over 6 years. (2) To compare the cumulative incidence of CIN2+ over three screening rounds following negative screening cytology with that following negative baseline HPV. (3) To determine whether or not HPV screening could safely extend the screening interval from 3 to 6 years. (4) To study the potential clinical utility of an increased cut-off of 2 relative light unit/mean control (RLU/Co) for Hybrid Capture 2 (HC2) and HPV genotyping in primary cervical screening. (5) To determine the potential impact of HPV vaccination with Cervarix in terms of preventing abnormal cytology and CIN2+. (6) To determine the cost-effectiveness of HPV primary screening compared with current practice using cervical cytology in England. DESIGN: The ARTISTIC study cohort was recalled for a third round of screening 3 years after round 2 and 6 years following their enrolment to the study. Both arms of the original trial used a single protocol during round 3. SETTING: ARTISTIC study cohort undergoing cervical screening in primary care in Greater Manchester, UK. PARTICIPANTS: Between July 2007 and September 2009, 8873 women participated in round 3; 6337 had been screened in round 2 and 2536 had not been screened since round 1. INTERVENTIONS: All women underwent liquid-based cytology and HPV testing and genotyping. Colposcopy was offered to women with moderate dyskaryosis or worse and with HPV-positive mild dyskaryosis/borderline changes. Women with negative cytology or HPV-negative mild dyskaryosis/borderline changes were returned to routine recall. MAIN OUTCOME MEASURES: Principal outcomes were cumulative rates of CIN2+ over three screening rounds by cytology and HPV status at entry; HPV type specific rates of CIN2+; effect of age on outcomes correlated with cytology and HPV status; comparison of HC2 cut-off RLU/Co of both 1 and 2; and cost-effectiveness of HPV primary screening. RESULTS: The median duration of follow-up was 72.7 months in round 3. Over the three screening rounds, there was no significant difference in CIN2+ [odds ratio (OR): 1.06, 95% confidence interval (CI) 0.89 to 1.26, p = 0.5)] or CIN3+ (OR: 0.90, 95% CI 0.72 to 1.14, p = 0.4) rates between the trial arms (revealed vs. concealed). Overall, 16% of women were HC2 positive at entry, decreasing from 40% in women aged 20-24 years to around 7% in women aged over 50 years. Abnormal cytology rates at entry were 13% for borderline+ and 2% for moderate+ cytology. Following positive cytology at entry, the cumulative rate of CIN2+ was 20.5%, and was 20.1% following a HPV-positive result at baseline. The cumulative CIN2+ rate for women who were HPV negative at baseline was only 0.87% (95% CI 0.70% to 1.06%) after three rounds of screening, significantly lower than that for women with negative cytology, which was 1.41% (95% CI 1.19% to 1.65%). Women who were HPV negative at baseline had similar protection from CIN2+ after 6 years as women who were

cytology negative at baseline after 3 years. Women who were HPV positive/cytology negative at baseline had a cumulative CIN2+ rate at 6 years of 7.7%, significantly higher than that for women who were cytology positive/HPV negative (3.2%). Women who were HPV type 16 positive at baseline had a cumulative CIN2+ rate over three rounds of 43.6% compared with 20.1% for any HPV-positive test. Using a HC2 cut-off of RLU/Co >/= 2 would maintain acceptable sensitivity and result in 16% fewer HPV-positive results. Typing data suggested that around 55-60% of high-grade cytology and CIN2+, but less than 25% of low-grade cytology, would be prevented by HPV vaccine given current rates of coverage in the UK national programme. For the cost-effectiveness analysis, most of the primary HPV strategies examined where HPV was used as the sole primary test were cost saving in both unvaccinated and vaccinated cohorts under baseline cost assumptions, with a 7-18% reduction in annual screening-associated costs in unvaccinated cohorts and a 9-22% reduction for vaccinated cohorts. Utilising partial genotyping at the primary screening stage to identify women with HPV 16/18 and referring them to colposcopy was the most effective strategy (barring co-testing, which is significantly more costly than any other strategies considered), resulting in 83 additional life-years per 100,000 women for unvaccinated women when compared with current practice, and similar life-years saved compared with current practice for vaccinated women. In unvaccinated cohorts, however, this genotyping strategy is predicted to result in a 20% increase in the number of colposcopies performed in England, although in vaccinated cohorts the number of colposcopy referrals was predicted to be lower than in current practice. For all strategies in which HPV is used as the sole primary screening test, decreasing the follow-up interval for intermediate-risk women from 24 to 12 months increased the overall effectiveness of primary HPV screening. In exploratory analysis, strategies for which cytology screening was retained until either age 30 or 35 years, and for which HPV testing was used at older ages, were predicted to be of higher costs and intermediate effectiveness than those associated with full implementation of primary HPV screening from age 25 years. However, this finding should be interpreted with caution as it depends on assumptions made about screening behaviour and compliance with recommendations at the 'switch over' point. CONCLUSIONS: HPV testing as an initial screen was significantly more protective over three rounds (6 years) than the current practice of cytology and the use of primary HPV screening could allow a safe lengthening of the screening interval. A substantial decrease in high-grade cytology and CIN2+ can be expected as a consequence of the HPV vaccination programme. A HC2 cut-off of 2RLU/Co instead of the manufacturer's recommended cut-off of 1 would be clinically beneficial in terms of an optimal balance between sensitivity and specificity. Modelled analysis predicts that primary HPV screening would be both more effective and cost saving compared with current practice with cervical cytology for a number of potential strategies in both unvaccinated and vaccinated cohorts. Compliance with surveillance and optimal management of HPV-positive/cytology-negative women after primary HPV screening is of key importance. Limitations of the economic investigation included the need to make assumptions around compliance with screening attendance and follow-up for longer screening intervals in the future, assumptions regarding maintenance of current uptake vaccination in the future, and assumptions regarding the stability of cost of HPV and cytology tests in the future. Detailed sensitivity analysis across a range of possible assumptions was conducted to address these issues. This study and the economic evaluation lend support to convert from cytology to HPV-based screening. Future work should include researching (i) the attitudes of women who test HPV positive/cytology negative, (ii) the value of complementary biomarkers and (iii) activities relevant to primary HPV screening in unvaccinated and vaccinated populations from the point of view of QALY assessment. STUDY REGISTRATION: Current

Controlled Trials ISRCTN25417821.

Hendry, M., D. Pasterfield, R. Lewis, A. Clements, S. Damery, R. D. Neal, R. Adke, D. Weller, C. Campbell, J. Patnick, P. Sasieni, C. Hurt, S. Wilson and C. Wilkinson (2012). "**Are women ready for the new cervical screening protocol in England? A systematic review and qualitative synthesis of views about human papillomavirus testing**." Br J Cancer **107**(2): 243-254.

BACKGROUND: A new protocol for human papillomavirus (HPV) testing within the UK cervical screening programme commenced in April 2011, creating new patient experiences. This is the first review to synthesise a substantial body of international evidence of women's information needs, views and preferences regarding HPV testing. We aimed to inform the development of educational materials to promote informed choice, reduce anxiety and improve disease control. METHODS: We searched 12 bibliographic databases. Two reviewers independently screened papers and assessed study quality; disagreements were resolved by discussion. Results were extracted verbatim and authors' findings treated as primary data. Studies were synthesised collaboratively using framework methods. RESULTS: We synthesised findings from 17 studies. Women had overwhelmingly negative concerns; an HPV diagnosis was daunting, had associated problems of disclosure of a sexually transmitted infection (STI), impacted on relationships and provoked fear of stigmatisation. Nevertheless, many thought HPV testing could be a preferable alternative to repeat cytology. Knowledge was poor; women struggled to interpret limited information in the context of existing knowledge about STIs and cervical cancer. CONCLUSION: Women are likely to be poorly informed, have limited understanding and many unanswered questions. This could increase anxiety and reduce ability to make informed choices, presenting a substantial challenge for those who design and provide information.

Herbert, A. (2017). "**Primary HPV testing: a proposal for co-testing in initial rounds of screening to optimise sensitivity of cervical cancer screening**." Cytopathology **28**(1): 9-15.

As explained by Kitchener in a previous issue of Cytopathology (2015;26:4-6), primary human papillomavirus (HPV) testing is likely to be introduced in the UK for all women aged 25-64 years following pilot site studies already in place. This will be necessary when the prevalence of cervical cancer and its precursors declines when vaccination takes effect but there is a risk in abandoning cytology as a primary test: a risk that would be most apparent in the present unvaccinated population in which the prevalence of cervical cancer and its precursors is exceptionally high. HPV testing is more sensitive than cytology but has a significant false-negative rate that could be detrimental to a successful screening programme if introduced without cytology backup. Accurate cytology would be needed for triage and could be compromised if HPV-negative tests were excluded from examination. This article proposes a compromise: cytology and HPV co-testing for the first two screening tests to optimise the sensitivity of the test as a whole. Registrations of invasive and in situ carcinoma of the uterine cervix in England indicate that the prevalence of the disease is highest in young women in the early rounds of screening. Calculations of the likely impact on the workload of this proposal have been based on a service evaluation of 295 cytology tests received at St Thomas' Hospital, which suggests that the volume of cytology tests would be reduced by approximately 60% compared with 80% for primary HPV testing alone. This proposal should be debated openly before irrevocable changes are made to a skilled workforce.

Herrington, C. S. (2015). "**The terminology of pre-invasive cervical lesions in the UK cervical screening programme**." Cytopathology **26**(6): 346-350.

The terminology of non-invasive epithelial abnormalities associated with an elevated risk of having or developing invasive cervical carcinoma (pre-invasive lesions) has been modified frequently over time as understanding of the underlying biology, and approaches to disease management, have changed. The arguments are now converging on the conclusion that the most appropriate terminology for cervical squamous intraepithelial abnormalities should be two-tier rather than three-tier. Given the findings of the Lower Anogenital Squamous Terminology (LAST) project in the USA, which have recently been endorsed by the World Health Organisation classification of tumours of female reproductive organs, the recommended terms are low-grade and high-grade squamous intraepithelial lesion (SIL), with the option of including the relevant cervical intraepithelial neoplasia (CIN) grade in parentheses. Although, at first sight, this appears to represent only a small change, there is a fundamental conceptual difference between the systems. The CIN system requires, first, the identification of a CIN lesion and, second, the determination of its grade on a continuum, with subsequent division into three grades. The SIL system is based on the existence of two different forms of human papillomavirus (HPV) infection, with productive infection leading to low-grade SIL and transforming infection leading to high-grade SIL.

Holmes, C., J. Mills and J. Chamberlain-Salaun (2014). "**Practice nurses and cervical screening: a two-country review**." Int J Nurs Pract **20**(1): 53-59.

The aim of this review is to explore the literature relating to the delivery of cervical screening by practice nurses (PNs) in the United Kingdom and Australia. Research relating to PNs began in earnest approximately 15 years ago in the UK context, and more recently, c.2005, in Australia. Although there is scant literature devoted specifically to the role of PNs in cervical screening, literature relating to the role of PNs provides evidence of the extent to which PNs in the United Kingdom and Australia are involved in the provision of cervical screening services. Findings from this review indicate that the role of PNs in the provision of cervical screening differs substantially between the United Kingdom and Australia. PNs in the United Kingdom provide a high percentage of cervical screening services, whereas in Australia general practitioners provide around 80% of all cervical smears, which account for only 0.6% of all procedures undertaken by PNs. Employment and funding models and inadequate multidisciplinary collaboration are contributing to the underutilization of PNs in Australia.

Hope, K. A., E. Moss, C. W. E. Redman and S. M. Sherman (2017). "**Psycho-social influences upon older women's decision to attend cervical screening: A review of current evidence**." Prev Med **101**: 60-66.

Cervical cancer is the fourth most common cancer in women worldwide (WHO, 2016). In many developed countries the incidence of cervical cancer has been significantly reduced by the introduction of organised screening programmes however, in the UK, a fall in screening coverage is becoming a cause for concern. Much research attention has been afforded to younger women but age stratified mortality and incidence data suggest that older women's screening attendance is also worthy of study. This paper provides a review of current evidence concerning the psycho-social influences that older women experience when deciding whether to attend cervical screening. Few studies have focussed on older women and there are significant methodological issues with those that have included them in their samples. Findings from these studies indicate several barriers which may deter older women from screening, such as embarrassment and logistical issues. Drivers to screening include reassurance and a sense of obligation. Physical, social and emotional changes that occur as women age may also have an impact on attendance. This review concludes that there is a clear need for better understanding

of the perceptions of older women specifically with regard to cervical cancer and screening. Future research should inform the design of targeted interventions and provision of information to enable informed decision-making regarding cervical screening among older women.

Jackowska, M., C. von Wagner, J. Wardle, D. Juszczyk, A. Luszczynska and J. Waller (2012). "**Cervical screening among migrant women: a qualitative study of Polish, Slovak and Romanian women in London, UK**." J Fam Plann Reprod Health Care **38**(4): 229-238.

OBJECTIVE: To explore awareness of and participation in cervical screening services in women from Poland, Slovakia and Romania living in London, UK. METHODS: Three qualitative studies were carried out in London in 2008-2009: an interview study of professionals working with Central and Eastern European migrants (n=11); a focus group study including three Polish, one Slovak and one Romanian focus group; and an interview study of Polish (n=11), Slovak (n=7) and Romanian (n=2) women. RESULTS: Awareness of the cervical screening programme was good, but understanding of the purpose of screening was sometimes limited. Some women were fully engaged with the UK screening programme; others used screening both in the UK and their countries of origin; and a third group only had screening in their home countries. Women welcomed the fact that screening is free and that reminders are sent, but some were concerned about the screening interval and the age of the first invitation. CONCLUSIONS: Migrant women from Poland, Slovakia and Romania living in London vary in their level of participation in the National Health Service Cervical Screening Programme. More needs to be done to address concerns regarding screening services, and to ensure that language is not a barrier to participation.

Kavanagh, K., K. Sinka, K. Cuschieri, J. Love, A. Potts, K. G. Pollock, H. Cubie, M. Donaghy and C. Robertson (2013). "**Estimation of HPV prevalence in young women in Scotland; monitoring of future vaccine impact**." BMC Infect Dis **13**: 519.

BACKGROUND: Estimation of pre-immunisation prevalence of HPV and distribution of HPV types is fundamental to understanding the subsequent impact of HPV vaccination. We describe the type specific prevalence of HPV in females aged 20-21 in Scotland who attended or defaulted from cervical screening using three specimen types; from attenders liquid based cytology and from defaulters urine or self-taken swabs. METHODS: Residual liquid based cytology samples (n = 2148), collected from women aged 20-21 attending for their first smear were genotyped for HPV. A sample (n = 709) from women who had defaulted from screening was also made available for HPV testing through the use of postal testing kits (either urine samples (n = 378) or self-taken swabs (n = 331)). Estimates of prevalence weighted by deprivation, and for the postal testing kit, also by reminder status and specimen type were calculated for each HPV type. The distribution of HPV types were compared between specimen types and the occurrence of multiple high-risk infections examined. The influence of demographic factors on high-risk HPV positivity and multiple infections was examined via logistic regression. RESULTS: The prevalence of any HPV in young women aged 20-21 was 32.2% for urine, 39.5% for self-taken swab, and 49.4% for LBC specimens. Infection with vaccine specific types (HPV 16, 18) or those associated with cross-protection (HPV 31, 33, 45, 51) was common. Individuals were more likely to test positive for high-risk HPV if they resided in an area of high deprivation or in a rural area. The overall distribution of HPV types did not vary between defaulters and attenders. Multiple infections occurred in 48.1% of high-risk HPV positive individuals. Excluding vaccine types the most common pairing was HPV 56 and 66. CONCLUSIONS: Understanding of the pre-immunisation prevalence of HPV in young women puts Scotland in a prime position to assess

the early effect of vaccination as the first highly vaccinated cohorts of individuals enter the screening programme. Differences in results with different specimen types must be taken into account when monitoring the impact of vaccination programmes.

Kavanagh, K., K. Sinka, K. Cuschieri, J. Love, A. Potts, K. G. J. Pollock, H. Cubie, M. Donaghy and C. Robertson (2013). "**Estimation of HPV prevalence in young women in Scotland; monitoring of future vaccine impact**." BMC Infect Dis **13**.

Background: Estimation of pre-immunisation prevalence of HPV and distribution of HPV types is fundamental to understanding the subsequent impact of HPV vaccination. We describe the type specific prevalence of HPV in females aged 20-21 in Scotland who attended or defaulted from cervical screening using three specimen types; from attenders liquid based cytology and from defaulters urine or self-taken swabs. Methods: Residual liquid based cytology samples (n = 2148), collected from women aged 20-21 attending for their first smear were genotyped for HPV. A sample (n = 709) from women who had defaulted from screening was also made available for HPV testing through the use of postal testing kits (either urine samples (n = 378) or self-taken swabs (n = 331)). Estimates of prevalence weighted by deprivation, and for the postal testing kit, also by reminder status and specimen type were calculated for each HPV type. The distribution of HPV types were compared between specimen types and the occurrence of multiple high-risk infections examined. The influence of demographic factors on high-risk HPV positivity and multiple infections was examined via logistic regression. Results: The prevalence of any HPV in young women aged 20-21 was 32.2% for urine, 39.5% for self-taken swab, and 49.4% for LBC specimens. Infection with vaccine specific types (HPV 16, 18) or those associated with cross-protection (HPV 31, 33, 45, 51) was common. Individuals were more likely to test positive for high-risk HPV if they resided in an area of high deprivation or in a rural area. The overall distribution of HPV types did not vary between defaulters and attenders. Multiple infections occurred in 48.1% of high-risk HPV positive individuals. Excluding vaccine types the most common pairing was HPV 56 and 66. Conclusions: Understanding of the pre-immunisation prevalence of HPV in young women puts Scotland in a prime position to assess the early effect of vaccination as the first highly vaccinated cohorts of individuals enter the screening programme. Differences in results with different specimen types must be taken into account when monitoring the impact of vaccination programmes.

Kitchener, H. C., M. Gittins, O. Rivero-Arias, A. Tsiachristas, M. Cruickshank, A. Gray, L. Brabin, D. Torgerson, E. J. Crosbie, A. Sargent and C. Roberts (2016). "**A cluster randomised trial of strategies to increase cervical screening uptake at first invitation (STRATEGIC)**." Health Technol Assess **20**(68): 1-138.

BACKGROUND: Falling participation by young women in cervical screening has been observed at a time that has seen an increase in the incidence of cervical cancer in the UK in women aged < 35 years. Various barriers to screening have been documented, including fear, embarrassment and inconvenience. OBJECTIVES: To measure the feasibility, clinical effectiveness and cost-effectiveness of a range of interventions to increase the uptake of cervical screening among young women. DESIGN: A cluster randomised trial based on general practices performed in two phases. SETTING: Primary care in Greater Manchester and the Grampian region in Scotland. PARTICIPANTS: Phase 1: 20,879 women receiving their first invitation for cervical screening. Phase 2: 10,126 women who had not attended by 6 months. INTERVENTIONS: Phase 1: pre-invitation leaflet or not, and access to online booking (Manchester only). Phase 2: (1) vaginal self-sampling kits (SSKs) sent unrequested (n = 1141); or (2) offered on request (n = 1290); (3)

provided with a timed appointment (n = 1629); (4) offered access to a nurse navigator (NN) (n = 1007); or (5) offered a choice between a NN or a SSK (n = 1277); and 3782 women in control practices. MAIN OUTCOME MEASURES: Uplift in screening compared with control practices, cost-effectiveness of interventions, and the women's preferences explored in a discrete choice experiment. RESULTS: The pre-invitation leaflet and offer of online booking were ineffective when compared with control practices at 3 months, 18.8% versus 19.2% [odds ratio (OR) 0.96, 95% confidence interval (CI) 0.88 to 1.06; p = 0.485] and 17.8% versus 17.2% (OR 1.02, 95% CI 0.87 to 1.20; p = 0.802), respectively. The uptake of screening at 3 months was higher among previously human papillomavirus (HPV)-vaccinated women than unvaccinated women, 23.7% versus 11% (OR 2.07, 95% CI 1.69 to 2.53; p < 0.001). Among non-attenders, the SSK sent intervention showed a statistically significant increase in uptake at 12 months post invitation, 21.3% versus 16.2% (OR 1.51, 95% CI 1.20 to 1.91; p = 0.001), as did timed appointments, 19.8% versus 16.2% (OR 1.41, 95% CI 1.14 to 1.74; p = 0.001). The offer of a NN, a SSK on request, and a choice between timed appointments and NN were ineffective. Overall, there was a gradual rather than prompt response, as demonstrated by uptake among control practices. A discrete choice experiment indicated that women invited who had not yet attended valued the attributes inherent in self-sampling. The health economic analysis showed that both timed appointments and unsolicited SSK sent were likely to be cost-effective at a cost per quality-adjusted life-year (QALY) gained of pound7593 and pound8434, respectively, if extended across the national 25-year-old cohort throughout the duration of screening. The certainty of these being cost-effective at a ceiling ratio of pound20,000 per QALY gained was > 90%. CONCLUSION: Women receiving their initial screening invitation frequently delay taking up the offer and the net impact of interventions was small. Timed appointments and SSKs sent to non-attenders at 6 months are likely to be a cost-effective means of increasing uptake and should be considered further. HPV vaccination in the catch-up programme was associated with an increased uptake of cervical screening. Future work should focus on optimising self-sampling in terms of age range, timing of offer for non-attenders and use of urine testing instead of vaginal samples. TRIAL REGISTRATION: Current Controlled Trials ISRCTN52303479. FUNDING: This project was funded by the NIHR Health Technology Assessment programme and will be published in full in Health Technology Assessment; Vol. 20, No. 68. See the NIHR Journals Library website for further project information.

Labeit, A. (2014). "**BREAST AND CERVICAL CANCER SCREENING IN UK: DYNAMIC INTERRELATED PROCESSES?**" Value in Health **17**(3): A143-A143.

Labeit, A., F. Peinemann and A. Kedir (2013). "**Cervical cancer screening service utilisation in UK**." Sci Rep **3**: 2362.

This study investigates empirically how past screening behaviour, individual and household characteristics affect the current uptake of cervical cancer screening in UK. For the conceptual framework, we use a modified Grossman model which is extended for non-economic factors. A dynamic version of a random effects panel probit model with initial conditions is estimated on the balanced sub-sample of the data. The analysis sample is restricted to women of age 16 and older and grouped into different age categories with respect to the NHS Cervical Screening Programme (NHSCSP). As dataset a balanced panel data of 857 women with 11,998 observations from the British Household Panel Study (BHPS) for the period from 1992 to 2008 is used for the analysis. Results suggest show that previous screening uptake, age, partner status, employment status and a previous GP visit have a significant influence on the likelihood of the

uptake of cervical cancer screening.

Labeit, A. M. and F. Peinemann (2017). "**Determinants of a GP visit and cervical cancer screening examination in Great Britain**." PLoS One **12**(4): e0174363.

OBJECTIVE: In the UK, women are requested to attend a cervical cancer test every 3 years as part of the NHS Cervical Screening Programme. This analysis compares the determinants of a cervical cancer screening examination with the determinants of a GP visit in the same year and investigates if cervical cancer screening participation is more likely for women who visit their GP. METHODS: A recursive probit model was used to analyse the determinants of GP visits and cervical cancer screening examinations. GP visits were considered to be endogenous in the cervical cancer screening examination. The analysed sample consisted of 52,551 observations from 8,386 women of the British Household Panel Survey. RESULTS: The analysis showed that a higher education level and a worsening self-perceived health status increased the probability of a GP visit, whereas smoking decreased the probability of a GP visit. GP visits enhanced the uptake of a cervical cancer screening examination in the same period. The only variables which had the same positive effect on both dependent variables were higher education and living with a partner. The probability of a cervical cancer screening examination increased also with previous cervical cancer screening examinations and being in the recommended age groups. All other variables had different results for the uptake of a GP visit or a cervical cancer screening examination. CONCLUSIONS: Most of the determinants of visiting a GP and cervical cancer screening examination differ from each other and a GP visit enhances the uptake of a smear test.

Lancucki, L., P. Sasieni, J. Patnick, T. J. Day and M. P. Vessey (2012). "**The impact of Jade Goody's diagnosis and death on the NHS Cervical Screening Programme**." J Med Screen **19**(2): 89-93.

OBJECTIVES: In August 2008 the British reality TV star Jade Goody made public her diagnosis of cervical cancer. In February 2009 it was announced that she was terminally ill and she died a few weeks later. A surge in cervical screening attendances associated with these events was widely reported. This paper aims to quantify the size of that effect across England, its duration, and whether it affected some groups of women more than others. SETTING: The Cervical Screening Programme in England. METHODS: Routinely collected statistics for the months around Jade Goody's diagnosis and death were compared with those for other periods. RESULTS: About half a million extra cervical screening attendances occurred in England between mid-2008 and mid-2009, the period during which Jade Goody was diagnosed and died; among these were 370 attendances where the test result was suspected neoplasia. At its peak in March 2009, attendance was 70% higher than expected. Increases were seen in both initial and follow-up screening attendances and in colposcopy attendances, and at all ages, though the magnitude was greater for women aged under 50. A substantially greater proportion of the extra attendances of women aged 25-49 on routine recall occurred in women whose attendance was overdue (28% occurred at 60 months or more) and relatively little represented over-screening (8% had been screened within the last 30 months). CONCLUSIONS: The pattern of increased attendance mirrored the pattern of media coverage of Jade Goody's diagnosis and death. It is likely that the increased screening resulted in a number of lives saved.

Landy, R., H. Birke, A. Castanon and P. Sasieni (2014). "**Benefits and harms of cervical screening from age 20 years compared with screening from age 25 years**." Br J Cancer **110**(7): 1841-1846.

BACKGROUND: To quantify the benefits (cancer prevention and down-staging) and harms (recall

and excess treatment) of cervical screening starting from age 20 years rather than from age 25 years. METHODS: We use routine screening and cancer incidence statistics from Wales (for screening from age 20 years) and England (screening from 25 years), and unpublished data from the National Audit of Invasive Cervical Cancer to estimate the number of: screening tests, women with abnormal results, referrals to colposcopy, women treated, and diagnoses of micro-invasive (stage 1A) and frank-invasive (stage IB+) cervical cancers (under three different scenarios) in women invited for screening from age 20 years and from 25 years. RESULTS: Inviting 100,000 women from age 20 years yields an additional: 119,000 screens, 20,000 non-negative results, 8000 colposcopy referrals, and an extra 3000 women treated when compared with inviting from age 25 years. Screening from age 20 years prevents between three and nine frank invasive cancers and between 0 and 23 cancers in total (depending on the scenario). A cumulative increase of nine stage IB+ cancers corresponds to an annual rate increase of 0.9 per 100,000 women aged 20-29 years. CONCLUSIONS: To prevent one frank invasive cancer, one would need to do between 12,500 and 40,000 additional screening tests in the age group 20-24 years and treat between 300 and 900 women.

Legood, R., M. Smith, J. B. Lew, R. Walker, S. Moss, H. Kitchener, J. Patnick and K. Canfell (2012). "**Cost effectiveness of human papillomavirus test of cure after treatment for cervical intraepithelial neoplasia in England: economic analysis from NHS Sentinel Sites Study**." Bmj **345**: e7086.

OBJECTIVES: To evaluate the cost effectiveness of human papillomavirus testing after treatment for cervical intraepithelial neoplasia (CIN). DESIGN: Economic analysis using a Markov modelling approach to combine cost and epidemiological data from the NHS Sentinel Sites Study with data from previous studies of post-treatment recurrence rates. SETTING: English NHS Cervical Cancer Screening Programme. INTERVENTIONS: Management guidelines after treatment of CIN involving annual cytology follow-up for 10 years, compared with alternative protocols using the human papillomavirus test to reduce the amount of post-treatment surveillance. MAIN OUTCOME MEASURES: Cases of underlying CIN3+ averted at 10 years and costs per 1000 women treated. RESULTS: Model predictions indicated that, at observed levels of compliance with post-treatment recommendations, management with only cytological follow-up would result in 29 residual cases of recurrent CIN3+ by 10 years and would cost pound358,222 (euro440,426; $574,910) (discounted) per 1000 women treated. Implementation of human papillomavirus test of cure in cytologically negative women according to the sentinel sites protocol would avert an additional 8.4 cases of CIN 3+ and reduce costs by pound9388 per 1000 women treated. CONCLUSIONS: Human papillomavirus test of cure would be more effective and would be cost saving compared with cytology only follow-up. The results of this evaluation support the full scale implementation of human papillomavirus test of cure after treatment of CIN within the NHS Cervical Screening Programme.

Lim, A. W., A. Hollingworth, S. Kalwij, G. Curran and P. Sasieni (2017). "**Offering self-sampling to cervical screening non-attenders in primary care**." J Med Screen **24**(1): 43-49.

Objectives To assess the feasibility and acceptability of offering self-sampling for Human Papillomavirus (HPV) testing to cervical screening non-attenders when they consult primary care for any reason. Methods In a pilot implementation study, six general practices in London, UK, offered self-sampling kits during consultation to women aged 25-64 who were at least six months overdue for cervical screening (no cytology test recorded in the past 3.5 years if aged 25-49, or 5.5 years if aged 50-64). Eligible women were identified using an automated real-time search (during consultation) of the general practice electronic medical record system. Women

collected samples either in clinic or at home (dry flocked swabs analysed using Roche Cobas(R)4800). Results Of approximately 5000 eligible women, 3131 consulted primary care between January and December 2014 (mean recruitment period 9.5 months). Of these, 21% (652) were offered kits, 14% (443) accepted, and 9% (292) returned a self-sample. The proportion of eligible women offered kits varied considerably among practices (11-36%). Sample return rates increased with kit offered rates (r = 0.8, p = 0.04). Of 39 HPV positive women 85% (33) attended follow-up, including two with invasive cancers (stage 2A1 and 1A1). Conclusions Offering self-sampling to cervical screening non-attenders opportunistically in primary care is feasible. Return rates could be increased if more women were offered kits. A large trial is needed to identify how self-sampling is best integrated into the national screening programme, and to identify determinants of uptake.

Lim, A. W., R. Landy, A. Castanon, A. Hollingworth, W. Hamilton, N. Dudding and P. Sasieni (2016). "**Cytology in the diagnosis of cervical cancer in symptomatic young women: a retrospective review**." Br J Gen Pract **66**(653): e871-e879.

BACKGROUND: Cervical cancer in young women presents a diagnostic challenge because gynaecological symptoms are common but underlying disease is rare. AIM: To explore the potential for using cytology as a diagnostic aid for cervical cancer in young women. DESIGN AND SETTING: Retrospective review of primary care records and cytology data from the national cervical screening database and national audit of cervical cancers. METHOD: Four datasets of women aged 20-29 years in England were examined: primary care records and national screening data from an in-depth study of cervical cancers; cytology from the national audit of cervical cancers; whole-population cytology from the national screening database; and general-population primary care records from the Clinical Practice Research Datalink. The authors explored the sensitivity and positive predictive value (PPV) of symptomatic cytology (earliest <12 months before diagnosis) to cervical cancer. RESULTS: The estimated prevalence of cervical cancer among symptomatic women was between 0.4% and 0.9%. The sensitivity of moderate dyskaryosis (high-grade squamous intraepithelial lesion [HSIL]) or worse in women aged 20-29 years was 90.9% to 96.2% across datasets, regardless of symptom status. The PPV was estimated to be between 10.0% and 30.0%. For women aged 20-24 years, the PPV of '?invasive squamous carcinoma' was 25.4%, and 2.0% for severe or worse cytology. CONCLUSION: Cytology has value beyond screening, and could be used as a diagnostic aid for earlier detection of cervical cancer in young women with gynaecological symptoms by ruling in urgent referral.

Lim, A. W. and P. Sasieni (2015). "**Consultation rates in cervical screening non-attenders: opportunities to increase screening uptake in GP primary care**." J Med Screen **22**(2): 93-99.

OBJECTIVE: To estimate the proportion of cervical screening non-attenders presenting to general practice (GP) primary care over one year. SETTING: 137 practices in East London, UK. METHODS: Anonymous primary care records were downloaded using EMIS web (clinical software). Cervical screening nonattendance was defined as no recorded smear in the last 3.5 years (women aged 25-49) or 5.5 years (women aged 50-64). The last three consultation entries were used to estimate the proportion of non-attenders who consulted in GP over 3 months and 1 year using the Kaplan-Meier method. Newly registered women were assessed separately. Results were calculated for each practice and the median and interquartile range (IQR) across practices are presented. Heterogeneity was assessed using funnel plots. RESULTS: Of 261,810 women, 224,313 (86%) had been registered for >1 year. The proportion classified as non-attenders differed between those registered for >1 year (30%, IQR 27%--35%) and within the

last year (49%, IQR 40%--57%), suggesting that screening records were less up-to-date in newly registered women. A median of 32% (IQR: 27%--37%) of non-attenders presented over 3 months, and 60% (IQR: 52%--67%) over 1 year. Funnel plots of the proportion of non-attenders presenting by the number of non-attenders showed substantial variation between practices. CONCLUSIONS: Over half of cervical screening non-attenders present to their GP at least once a year, in over 75% of practices. This represents a good opportunity for improving coverage by offering an alternative form of screening, such as self-sampling for human papillomavirus testing.

Macedo, A., J. Waller, J. Patnick and L. Marlow (2012). "**Cervical screening uptake, political interest and voter turnout: a population-based survey of women in England**." J Med Screen **19**(4): 189-194.

OBJECTIVES: To examine the relationship between cervical screening uptake and political engagement, and to test whether political engagement and voting behaviour mediate the association between age and cervical screening uptake. SETTING: A population-based survey of women in England in 2010. METHODS: Women aged 26-64 took part in home-based computer-assisted interviews (n = 890). Women were classified as 'up to date' or 'overdue/never been screened' for cervical screening. RESULTS: Most women (81%) were up-to-date with screening; 19% were overdue. Age and marital status were associated with screening status. Women who were not registered to vote, had not voted in previous general elections, and those who showed less interest in elections and lower intention to engage in political activities were more likely to be overdue for screening. In multivariate analyses (adjusting for all significant measures) 'being on the electoral register' was the only significant independent predictor of screening status. 'Being on the electoral register' was also the only measure of voting behaviour that mediated the association between age and screening status. CONCLUSION: We found limited evidence for the hypothesis that falling attendance for cervical screening could be associated with a broader phenomenon of disillusionment as indexed by reported voting behaviour and other measures of political engagement. Alternative explanations should be considered in order to better understand falling cervical screening uptake, particularly among younger women.

Marlow, L. A., A. Sangha, J. Patnick and J. Waller (2012). "**The Jade Goody Effect: whose cervical screening decisions were influenced by her story?**" J Med Screen **19**(4): 184-188.

OBJECTIVES: In 2009 more women attended cervical screening in England and Wales than in the previous year. Described as the 'Jade Goody Effect' this was attributed to the death from cervical cancer of a UK celebrity. The present study aimed to establish which sociodemographic characteristics were associated with being influenced by Jade Goody's story. METHODS: Data were collected as part of a Taylor Nelson Sofres (TNS) omnibus survey using random location sampling. Women in England aged 26-64 years were asked to report whether they felt Jade Goody's story had influenced their decisions about cervical screening over the 18 months between her death and the time of the survey. RESULTS: Data from 890 participants was included in analysis. Over a third of women felt Goody's story had influenced their decisions about cervical screening (40%). Younger women (aged 26-35 years) were more likely to have been influenced by Goody's story than older women (56-64 year olds). There was also evidence of socioeconomic variation with women from lower socioeconomic class groups and those with fewer educational qualifications more likely to say they had been influenced by Goody's story. CONCLUSIONS: The 'Jade Goody Effect', as acknowledged by women themselves, was more pronounced among young women and influenced screening decisions more markedly among those from lower socioeconomic backgrounds. Narrative communication may be an effective

way to encourage attendance at cervical cancer screening and reach groups of the population that are difficult to reach using traditional intervention methods.

Marlow, L. A. V., J. Wardle and J. Waller (2015). "**Understanding cervical screening non-attendance among ethnic minority women in England**." Br J Cancer **113**(5): 833-839.

Background: Women from Black, Asian and Minority Ethnic (BAME) backgrounds are less likely to attend cervical screening than White British women. This study explored sociodemographic and attitudinal correlates of cervical screening non-attendance among BAME women. Methods: Women (30-60 years) were recruited from Indian, Pakistani, Bangladeshi, Caribbean, African and White British backgrounds (n = 720). Participants completed structured interviews. Results: BAME women were more likely to be non-attenders than white British women (44-71% vs 12%) and fell into two groups: the disengaged and the overdue. Migrating to the United Kingdom, speaking a language other than English and low education level were associated with being disengaged. Being overdue was associated with older age. Three attitudinal barriers were associated with being overdue for screening among BAME women: low perceived risk of cervical cancer due to sexual inactivity, belief that screening is unnecessary without symptoms and difficulty finding an appointment that fits in with other commitments. Conclusions: BAME non-attenders appear to fall into two groups, and interventions for these groups may need to be targeted and tailored accordingly. It is important to ensure that BAME women understand cancer screening is intended for asymptomatic women and those who have ceased sexual activity may still be at risk.

Massat, N. J., E. Douglas, J. Waller, J. Wardle and S. W. Duffy (2015). "**Variation in cervical and breast cancer screening coverage in England: a cross-sectional analysis to characterise districts with atypical behaviour**." BMJ Open **5**(7): e007735.

OBJECTIVES: Reducing cancer screening inequalities in England is a major focus of the 2011 Department of Health cancer outcome strategy. Screening coverage requires regular monitoring in order to implement targeted interventions where coverage is low. This study aimed to characterise districts with atypical coverage levels for cervical or breast screening. DESIGN: Observational study of district-level coverage in the English Cervical and Breast screening programmes in 2012. SETTING: England, UK. PARTICIPANTS: All English women invited to participate in the cervical (age group 25-49 and 50-64) and breast (age group 50-64) screening programmes. OUTCOMES: Risk adjustment models for coverage were developed based on district-level characteristics. Funnel plots of adjusted coverage were constructed, and atypical districts examined by correlation analysis. RESULTS: Variability in coverage was primarily explained by population factors, whereas general practice characteristics had little independent effect. Deprivation and ethnicity other than white, Asian, black or mixed were independently associated with poorer coverage in both screening programmes, with ethnicity having the strongest effect; by comparison, the influence of Asian, black or mixed ethnic minority was limited. Deprivation, ethnicity and urbanisation largely accounted for the lower cervical screening coverage in London. However, for breast screening, being located in London remained a strong negative predictor. A subset of districts was identified as having atypical coverage across programmes. Correlates of deprivation in districts with relatively low adjusted coverage were substantially different from overall correlates of deprivation. DISCUSSION: These results inform the continuing drive to reduce avoidable cancer deaths in England, and encourage implementation of targeted interventions in communities residing in districts identified as having atypically low coverage. Sequential implementation to monitor the impact of local

interventions would help accrue evidence on 'what works'.

McBride, E., L. Marlow, A. S. Forster, S. Moss, J. Myles, H. Kitchener, J. Patnick and J. Waller (2016). "**Psychological Impact of Primary Screening (PIPS) for HPV: a protocol for a cross-sectional evaluation within the NHS cervical screening programme**." BMJ Open **6**(12): e014356.

INTRODUCTION: The NHS Cervical Screening Programme is now using human papillomavirus (HPV) testing as the primary test in six sentinel sites in England, with the intention of rolling this out across the whole of England. Previous research evaluating HPV testing in the cervical screening context suggests that an HPV-positive result may increase anxiety beyond that associated with abnormal cytology, but this has not been explored in the context of primary HPV testing. The main aim of this study is to explore the impact of the HPV primary screening programme on anxiety and distress. METHODS AND ANALYSIS: A cross-sectional between-groups design (total N approximately 673) will be employed to assess the psychological impact of different HPV and cytology results at three time points: shortly after receiving the results, and 6 and 12 months later. Women will fall into one of six groups based on their screening results. The primary outcomes will be anxiety and general distress. Secondary outcomes will include understanding of screening results, perceived risk of cervical cancer, psychosexual functioning, intention to attend future screening and knowledge of HPV. General linear modelling will be used to test for differences between groups and changes over the three time points. ETHICS AND DISSEMINATION: Health Research Authority approval was received on 26 September 2016. Ethical approval was received from London- Surrey Borders NHS Research Ethics Committee on 30 August 2016. Section 251 approval was received from the Confidentiality Advisory Group on 24 August 2016. Results will be disseminated via peer-reviewed publication and presentation at national and international conferences.

McKenna, M. and M. M. McMenamin (2014). "**Human papillomavirus testing in young women: clinical outcomes of human papillomavirus triage in a UK cervical screening program**." Cancer Cytopathol **122**(9): 702-710.

BACKGROUND: In the United Kingdom, human papillomavirus (HPV) testing is used to triage women with borderline cytology or mild dyskaryosis; however, in young women, the value of triage is limited by the high HPV prevalence rate. The current study examined the impact of HPV triage on colposcopy referral, colposcopy procedures, and patient outcome in a cervical screening population that included women aged < 25 years. METHODS: Women aged 18 to 65 years attending for cervical screening in Northern Ireland were tested for HPV if their cytology result demonstrated borderline cytology or mild dyskaryosis. Of the 866 women eligible for HPV triage, those who tested negative for HPV were returned to routine screening and women who tested positive were referred to colposcopy. RESULTS: HPV prevalence was 82.07% in women aged < 25 years and 54.69% in women aged >/= 25 years. Colposcopy referrals increased by 42.67%. The odds of undergoing a large loop excision of the transformation zone (LLETZ) compared with punch biopsy increased by 0.056 per year above the age of 31 years. LLETZ performed in women aged >/= 25 years and those aged < 25 years yielded rates of cervical intraepithelial neoplasia of type 2 or higher (>/= CIN2) of 57.04% and 80.00%, respectively. The positive predictive value of HPV triage for detecting >/= CIN2 was 29.92% in women aged < 25 years and 27.51% in the older age group. CONCLUSIONS: HPV triage substantially increased colposcopy referrals. The positive predictive value of a positive HPV test to detect >/= CIN2 was not affected by age. LLETZ performed in women aged < 25 years yielded higher rates of >/= CIN2 compared with the older age group.

McRae, J., C. Martin, J. O'Leary and L. Sharp (2014). ""**If you can't treat HPV, why test for it?" Women's attitudes to the changing face of cervical cancer prevention: a focus group study**." BMC Womens Health **14**: 64.

BACKGROUND: The relationship between infection with high-risk strains of human papillomavirus (HPV) and cervical cancer is transforming prevention through HPV vaccination and HPV oncogenic testing. In Ireland, a national cervical cancer screening programme and HPV vaccination were recently launched; HPV testing is currently being integrated into the screening programme. Women's views on the transformation of cervical cancer prevention have been relatively little investigated. METHODS: Using qualitative focus groups, we determined women's knowledge, attitudes towards, and acceptability of cervical cancer screening, HPV oncogenic testing and vaccination of HPV. Fifty nine women, recruited through primary care in Ireland, participated in ten focus groups. A dynamic topic guide was developed from literature reviewed. Women were provided with standardised information about HPV infection, HPV testing. Discussion transcripts were analysed thematically. RESULTS: The primary themes that emerged regarding HPV infection were: knowledge, emotional response and societal influences; especially those of healthcare practitioners. Knowledge, logistics, and psychological impact were the primary themes relating to HPV testing. Women's attitudes towards HPV testing changed during discussion as issues were explored, thus demonstrating the complexity of this issue; lack of existing treatment for HPV infection influenced women's attitudes, attachment to existing cervical cancer screening also was a significant factor. CONCLUSIONS: Women currently have a strong attachment to cytology and any changes towards HPV primary testing will need to be managed carefully. To ensure that future cervical cancer prevention strategies will be acceptable to women, sufficient thought will have to be given to information provision and education. We identified the importance to women of healthcare practitioners' opinions regarding HPV. Appropriate and timely information on HPV will be crucial in order to minimise possible psychological effects women may have.

Moss, S. M., A. Bailey, H. Cubie, K. Denton, A. Sargent, P. Muir, I. B. Vipond, R. Winder and H. Kitchener (2015). "**Comparison of the performance of HPV tests in women with abnormal cytology: results of a study within the NHS cervical screening programme**." Cytopathology **26**(6): 373-380.

OBJECTIVE: The use of testing for human papillomavirus (HPV) is now recognized as an efficient means of triaging women with low-grade cytological abnormalities to either immediate referral to colposcopy or return to routine recall. We aimed to determine the sensitivity and specificity of each of four newer tests for HPV relative to the Qiagen Hybrid Capture 2 (HC2) assay in order to determine whether they could be approved for use in triage in the NHS cervical screening programme. METHODS: We compared the performance of each of four different HPV assays (Abbott M2000, Roche Cobas, Hologic Cervista and Gen-Probe APTIMA) with that of HC2 in order to determine the sensitivity and specificity of each test relative to HC2 for the detection of cervical intraepithelial neoplasia (CIN) grade 2 or worse, using routine cytology samples reported as borderline (atypical squamous cells) or mild dyskaryosis (low-grade squamous intraepithelial lesion) from six laboratories in England. All women who were found to be HPV positive on any test were referred to colposcopy. RESULTS: Between 2072 and 4217 tests were performed with each assay. All four assays were shown to have a relative sensitivity of no worse than 95% compared with HC2 when a cut-off of 2 relative light units (RLU) was used. All assays had higher relative specificity than HC2 for both borderline and mild cytology referrals (1.06-1.61). CONCLUSIONS: All assays tested met the criteria required. Consequently, all have now

been approved for use in HPV triage in the NHS cervical screening programme.

Munro, A., C. Gillespie, S. Cotton, C. Busby-Earle, K. Kavanagh, K. Cuschieri, H. Cubie, C. Robertson, L. Smart, K. Pollock, C. Moore, T. Palmer and M. E. Cruickshank (2017). "**The impact of human papillomavirus type on colposcopy performance in women offered HPV immunisation in a catch-up vaccine programme: a two-centre observational study**." Bjog **124**(9): 1394-1401.

OBJECTIVE: To determine whether human papillomavirus (HPV) immunisation has affected the prevalence of HPV genotypes and colposcopic features of cervical intraepithelial neoplasia (CIN) in young women referred for colposcopy. DESIGN: A two-centre observational study including vaccinated and unvaccinated women. SETTING: Colposcopy clinics serving two health regions in Scotland, UK. POPULATION: A total of 361 women aged 20-25 years attending colposcopy following an abnormal cervical cytology result at routine cervical screening. METHODS: Cervical samples were obtained from women for HPV DNA genotyping and mRNA E6/E7 expression of HPV 16, 18, 31, 33, and 45. Demographic data, cytology, and histology results and colposcopic features were recorded. Chi-square analysis was conducted to identify associations between vaccine status, HPV genotypes, and colposcopic features. MAIN OUTCOME MEASURES: Colposcopic features, HPV genotypes, mRNA expression, and cervical histology. RESULTS: The prevalence of HPV 16 was significantly lower in the vaccinated group (8.6%) compared with the unvaccinated group (46.7%) (P = 0.001). The number of cases of CIN2+ was significantly lower in women who had been vaccinated (P = 0.006). The HPV vaccine did not have a statistically significant effect on commonly recognised colposcopic features, but there was a slight reduction in the positive predictive value (PPV) of colposcopy for CIN2+, from 74% (unvaccinated) to 66.7% (vaccinated). CONCLUSIONS: In this group of young women with abnormal cytology referred to colposcopy, HPV vaccination via a catch-up programme reduced the prevalence of CIN2+ and HPV 16 infection. The reduced PPV of colposcopy for the detection of CIN2+ in women who have been vaccinated is at the lower acceptable level of the UK national cervical screening programme guidelines. TWEETABLE ABSTRACT: Reduction of hrHPV positivity and CIN in immunised women consistent with lower PPV of colposcopy for CIN2+.

Nankya, E., C. Wood, J. Ainsworth, A. Schwenk, A. Waters and V. Johnston (2015). "**Assessing the uptake of cervical screening amongst HIV-positive women attending an HIV clinic in the UK**." HIV Med **16**: 71-71.

O'Brien, K. M. and L. Sharp (2013). "**Trends in incidence of, and mortality from, cervical lesions in Ireland: baseline data for future evaluation of the national cervical screening programme**." Cancer Epidemiol **37**(6): 830-835.

AIM: To investigate incidence and mortality trends for cervical lesions in Ireland in the period 1994-2008. METHODS: We used data from the National Cancer Registry, Ireland and national death registration data to calculate age-standardised rates for the periods of interest. We used standardised rate ratios to test whether incidence was associated with socio-demographic variables and used Joinpoint to examine trends by morphology grouping. RESULTS: Incidence of cervical cancer and cervical intraepithelial neoplasia (CIN3) rose over the period 1994-2008. The annual percentage change for cervical cancer was 1.8% and that for CIN3 was 3.8%. Women resident in the most deprived areas had invasive cervical cancer incidence almost twice as high as those resident in the least deprived areas (standardised rate ratio (SRR)=1.8). Comparing incidence in Ireland to England and Wales, Northern Ireland and Scotland in the three years 2005-2007, the SRRs (other areas vs. Ireland) were 0.70, 0.88 and 0.84 respectively. Cervical

cancer rates have fallen in these countries in the same period that there is a rise demonstrated in Ireland. CONCLUSION: Incidence rates of cervical cancer rose in Ireland steadily, albeit modestly, during 1994-2008, most likely due to long-term changes in patterns of sexual behaviour and contraceptive use. A more pronounced rise in CIN3 rates point to considerable levels of opportunistic screening during this period. Mortality rates have changed little over the past four decades, in contrast to trends in countries with well-organised screening programmes.

O'Connor, M., J. Murphy, C. Martin, J. O'Leary and L. Sharp (2014). "**Motivators for women to attend cervical screening: the influential role of GPs**." Fam Pract **31**(4): 475-482.

BACKGROUND: Participation in organized cervical cancer screening has declined recently. While research has focussed on barriers to screening participation, less attention has been paid to what motivates women to attend. Moreover, little is known about health care provider/practitioner-level barriers and facilitators to participation. Better understanding of these issues could help inform strategies to improve participation. OBJECTIVES: To explore the role of GPs in influencing women's cervical screening behaviours and investigate other motivators for women to attend for a cervical smear. METHODS: Ten focus groups were conducted in Ireland, shortly before the launch of a national cervical screening programme. Discussions were audio-recorded, transcribed verbatim and transcripts were analysed thematically. RESULTS: GPs greatly influence women's screening behaviours and can have a positive or negative impact on women's participation in screening. Four major subthemes emerged in relation to this: the attitude of the GP; prompting by the GP; trust in the GP and women's relationships with their GP. Two main motivators to screening participation were identified: personal reasons/benefits (e.g. potential of smears to be life-saving); and practical issues/convenience. Women's also expressed desires for what they would like to see incorporated in the national screening programme (e.g. an 'out-of-hours' service). CONCLUSION: GPs can impact positively and negatively on women's cervical screening participation. Providing on-going support to GPs around their cervical screening practices is essential to maximize screening attendance. Targeted information materials that focus on the personal reasons and benefits of having smear tests could help stimulate women to participate.

Osborn, D. P., L. Horsfall, A. Hassiotis, I. Petersen, K. Walters and I. Nazareth (2012). "**Access to cancer screening in people with learning disabilities in the UK: cohort study in the health improvement network, a primary care research database**." PLoS One **7**(8): e43841.

OBJECTIVES: To assess whether people with learning disability in the UK have poorer access to cancer screening. DESIGN: Four cohort studies comparing people with and without learning disability, within the recommended age ranges for cancer screening in the UK. We used Poisson regression to determine relative incidence rates of cancer screening. SETTING: The Health Improvement Network, a UK primary care database with over 450 General practices. PARTICIPANTS: Individuals with a recorded diagnosis of learning disability including general diagnostic terms, specific syndromes, chromosomal abnormalities and autism in their General Practitioner computerised notes. For each type of cancer screening, a comparison cohort of up to six people without learning disability was selected for each person with a learning disability, using stratified sampling on age within GP practice. MAIN OUTCOME MEASURES: Incidence rate ratios for receiving 1) a cervical smear test, 2) a mammogram, 3) a faecal occult blood test and 4) a prostate specific antigen test. RESULTS: Relative rates of screening for all four cancers were significantly lower for people with learning disability. The adjusted incidence rate ratios (95% confidence intervals) were Cervical smears: Number eligible with learning disability = 6,254; IRR

= 0.54 (0.52-0.56). Mammograms: Number eligible with learning disability = 2,956; IRR = 0.76 (0.72-0.81); Prostate Specific Antigen: Number eligible = 3,520; IRR = 0.87 (0.80-0.96) and Faecal Occult Blood Number eligible = 6,566; 0.86 (0.78-0.94). Differences in screening rates were less pronounced in more socially deprived areas. Disparities in cervical screening rates narrowed over time, but were 45% lower in 2008/9, those for breast cancer screening appeared to widen and were 35% lower in 2009. CONCLUSION: Despite recent incentives, people with learning disability in the UK are significantly less likely to receive screening tests for cancer that those without learning disability. Other methods for reducing inequalities in access to cancer screening should be considered.

Palmer, T. J., M. McFadden, K. G. Pollock, K. Kavanagh, K. Cuschieri, M. Cruickshank, S. Cotton, S. Nicoll and C. Robertson (2016). "**HPV immunisation and cervical screening--confirmation of changed performance of cytology as a screening test in immunised women: a retrospective population-based cohort study**." Br J Cancer **114**(5): 582-589.

BACKGROUND: To document the effect of bivalent HPV immunisation on cervical cytology as a screening test and assess the implications of any change, using a retrospective analysis of routinely collected data from the Scottish Cervical Screening Programme (SCSP). METHODS: Data were extracted from the Scottish Cervical Call Recall System (SCCRS), the Scottish Population Register and the Scottish Index of Multiple Deprivation. A total of 95 876 cytology records with 2226 linked histology records from women born between 1 January 1988 and 30 September 1993 were assessed. Women born in or after 1990 were eligible for the national catch-up programme of HPV immunisation. The performance of cervical cytology as a screening test was evaluated using the key performance indicators used routinely in the English and Scottish Cervical Screening Programmes (NHSCSP and SCSP), and related to vaccination status. RESULTS: Significant reductions in positive predictive value (16%) and abnormal predictive value (63%) for CIN2+ and the mean colposcopy score (18%) were observed. A significant increase (38%) in the number of women who had to be referred to colposcopy to detect one case of CIN2+ was shown. The negative predictive value of negative- or low-grade cytology for CIN2+ increased significantly (12%). Sensitivity and specificity, as used by the UK cervical screening programmes, were maintained. CONCLUSIONS: The lower incidence of disease in vaccinated women alters the key performance indicators of cervical cytology used to monitor the quality of the screening programme. These findings have implications for screening, colposcopy referral criteria, colposcopy practice and histology reporting.

Patel, A., K. Galaal, C. Burnley, K. Faulkner, P. Martin-Hirsch, M. J. Bland, S. Leeson, H. Beer, S. Paranjothy, P. Sasieni and R. Naik (2012). "**Cervical cancer incidence in young women: a historical and geographic controlled UK regional population study**." Br J Cancer **106**(11): 1753-1759.

BACKGROUND: The commencing age of cervical screening in England was raised from 20 to 25 years in 2004. Cervical cancer incidence in young women of England is increasing. It is not clear if this is due to either greater exposure to population risk factors or reduced cervical screening. METHODS: We measured if the relative risk of cervical cancer in younger women (20-29 years) of the north-east of England (NE) differed to that of women aged 30yrs and above since 2004. We also measured average annual percentage change (AAPC) in the 3 yr moving average incidence for all age-groups. Regional screening coverage rate and population risk factors were reviewed. Comparisons were made with Wales where screening continues to commence from the age of 20yrs. RESULTS: Cervical cancer incidence in women aged 20-29 increased annually by an average of 10.3% between 2000 and 2009. The rise in women aged 30-39 was less steep

(3.5%/year) but no significant rise was observed in women aged 40-49. Socioeconomic factors remained stable or improved during the time period except for the incidence of chlamydia, herpes simplex and in particular, genital warts, which increased significantly in young women. Data from Wales show similar results. CONCLUSION: The incidence of cervical cancers in young women of the NE is increasing. The rise in incidence is unrelated to the change in screening policy in 2004. Close monitoring of incidence in young women and a greater attempt to reverse the current decline in screening coverage of women aged 25-29 years are recommended.

Reilly, R., S. Paranjothy, H. Beer, C. J. Brooks, H. M. Fielder and R. A. Lyons (2012). "**Birth outcomes following treatment for precancerous changes to the cervix: a population-based record linkage study**." Bjog **119**(2): 236-244.

OBJECTIVE: To examine whether treatments for precancerous changes to the cervix are associated with adverse birth outcomes in subsequent pregnancies. DESIGN: Population-based retrospective cohort study using electronic linkage of data from the Welsh cervical screening programme and a national routine child health database. SETTING: Wales. POPULATION: A total of 174,325 women aged 20-39 years who received cervical screening between April 2001 and March 2004. METHODS: Logistic regression was used to compare the odds of each birth outcome between women who had negative cervical smears and women who received either colposcopy +/- punch biopsy only or colposcopy and excisional or ablative treatments, adjusted for confounding factors (e.g. age, social deprivation and smoking). MAIN OUTCOME MEASURES: Preterm birth (before 37, 32 and 28 weeks of gestation), and low birthweight (<2500 g). RESULTS: Compared with women who had negative cervical smears, the odds ratio for preterm birth (<37 weeks) was significantly increased in women who had colposcopy only (adjusted odds ratio 1.54, 95% CI 1.32-1.80) and single excisional treatment (adjusted odds ratio 1.77, 95% CI 1.47-2.13). Similar results were observed for preterm birth at <32 weeks of gestation. There was no increased risk of preterm birth or low birthweight for women who had treatment compared with women who had colposcopy only. CONCLUSION: Women who were referred for colposcopy had an increased risk of preterm births regardless of whether or not they received treatment to the cervix. This increased risk could be the result of common risk factors for abnormal smears and preterm birth.

Sadler, L., R. Albrow, R. Shelton, H. Kitchener and L. Brabin (2013). "**Development of a pre-notification leaflet to encourage uptake of cervical screening at first invitation: a qualitative study**." Health Educ Res **28**(5): 793-802.

Cervical screening attendance among women aged 25-29 years in England is lower than at older ages. There is some evidence that pre-notification leaflets motivate women who have not yet considered their response to a health intervention. We aimed to identify key information to motivate young women at their first cervical screening invitation. Six focus groups were conducted, five with young women aged 17-25 registered with a General Practice in Manchester, UK, and one with Practice nurses. Some women took part in two further groups to discuss leaflet design. There was low awareness of the purpose or procedures of cervical screening, and most women were de-motivated by reports of bad experiences. Some intended to be screened, but not immediately after invitation. Screening was viewed as a test for a cancer that affected older women. Since none of the participants believed that they had cervical cancer, screening seemed unnecessary. We conclude that the perception that screening is unimportant when you are young needs to be challenged. Women also need to be better informed of screening procedures. A pre-notification leaflet incorporating key information was

designed and will be tested in a randomized trial of complex interventions within the routine cervical screening programme.

Sasieni, P. and A. Castanon (2012). "**Dramatic increase in cervical cancer registrations in young women in 2009 in England unlikely to be due to the new policy not to screen women aged 20-24**." J Med Screen **19**(3): 127-132.

OBJECTIVE: To explore whether the 17% increase in cervical cancer in England in 2009 was due to the change in cervical screening policy. METHODS: Trends in incidence of cervical cancer and of cervical intraepithelial neoplasia grade 3 (CIN3) were analysed for England, Wales and Scotland. Invasive cervical cancer data on 4079 cancers in women aged 20-39 diagnosed between April 2007 and August 2011 in England were analysed by single year of age. RESULTS: In England there was a 38% (95% confidence intervals [CI] 18-62%) increase in cervical cancer incidence rates in women aged 25-29 in 2009 relative to 2008, and a 30% (11-51%) increase in women aged 35-39. Compared rates in 2010 are similar to those in 2008. The average increase between 2000 and 2010 in women aged 25-29 was no greater in England than in Scotland and Wales (relative risk 0.98, 95% CI 0.69-1.39). In England there has been a gradual increase in CIN3 (particularly for ages 25-29) since 2003, with a more dramatic increase in 2009, but a fall in 2010. Audit data showed an increase in cancers diagnosed at age 25 in 2009/2010 and 2010/2011 (P </= 0.0004). No increase was observed at age 26. For ages 27-29 an increase in cancer was observed for 2008/2009-2009/2010 when compared with 2007/2008-2010/2011 (P < 0.00001), but linear trends were not significant. CONCLUSIONS: The increase in cervical cancer in England in 2009 cannot be attributed to the lack of screening of women aged 20-24, or to a general decrease in the coverage or quality of cervical screening.

Savage, E. M., R. Clarke and A. L. Bell (2012). "**An audit of cervical screening in patients attending the Northern Ireland Systemic Lupus Erythematosus (SLE) Clinic**." Ir J Med Sci **181**: 66-67.

Sharp, L., S. Cotton, M. Cruickshank, N. Gray, L. Smart, D. Whynes and J. Little (2016). "**Impact of post-colposcopy management on women's long-term worries: results from the UK population-based TOMBOLA trial**." J Fam Plann Reprod Health Care **42**(1): 43-51.

BACKGROUND: Effective cervical screening reduces cancer incidence and mortality. However, these benefits may be accompanied by some harms, potentially including, adverse psychological impacts. Studies suggest women may have concerns about various specific issues, such as cervical cancer. AIM: To compare worries about cervical cancer, future fertility, having sex, and general health between women managed by alternative policies at colposcopy. DESIGN: Multicentre individually-randomised controlled trial, nested within the National Health Service Cervical Screening Programmes. SETTING: UK. METHODS: 1515 women, aged 20-59 years, with low-grade cytology who attended colposcopy during February 2001-October 2002, were randomised to immediate loop excision or punch biopsies with recall for treatment if cervical intraepithelial neoplasia (CIN)2/3 was confirmed. Women completed questionnaires at recruitment and after 12, 18, 24 and 30 months. Outcomes were prevalence of worries at each time-point (point prevalence) and at any time-point during follow-up (12-30 months; cumulative prevalence). Primary analysis was by intention-to-treat (ITT); secondary per-protocol analysis compared groups according to management received among women with an abnormal transformation zone. RESULTS: Cumulative prevalence of worries was: cervical cancer 40%; having sex 26%, future fertility 24%, and general health 60%. In ITT analyses, there were no statistically significant differences between management arms in cumulative or point prevalence

of any of the worries. In per-protocol analyses, between-group differences were significant only for future fertility; cumulative prevalence was highest in women who underwent punch biopsies and treatment. CONCLUSIONS: There is no difference in the prevalence of specific worries in women randomised to alternative post-colposcopy management policies. CLINICAL TRIAL REGISTRATION: ISRCTN: 34841617.

Sharp, L., S. Cotton, A. Thornton, N. Gray, D. Whynes, L. Smart, N. Waugh, I. Duncan, M. Cruickshank and J. Little (2012). "**Which women default from follow-up cervical cytology tests? A cohort study within the TOMBOLA trial**." Cytopathology **23**(3): 150-160.

OBJECTIVE: To identify factors associated with default from follow-up cervical cytology tests. METHODS: A cohort study was conducted involving 2166 women, aged 20-59, with recent low-grade cervical cytology taken within the NHS Cervical Screening Programmes in Scotland and England, and managed by 6-monthly cytology in primary care. For the first (6-month) and second (12-month) surveillance cytology tests separately, women were categorized as 'on-time attendees' (attended </=6 months of test being due), 'late attendees' (attended greater than 6 months after test was due) or 'non-attendees' (failed to attend). Multivariate odds ratios (ORs) were computed for factors associated with late and non-attendance. RESULTS: For the first surveillance test, risk of non-attendance was significantly higher in younger women, those without post-secondary education, and non-users of prescribed contraception. Factors significantly associated with late attendance for the first test were the same as for non-attendance, plus current smoking and having children. The most important predictor of non-attendance for the second surveillance test was late attendance for the first test (OR = 9.65; 95% CI, 6.60-16.62). Non-attendance for the second test was also significantly higher among women who were younger, smokers and had negative cytology on the first surveillance test. Late attendance for the second surveillance test was higher in women who were younger, smokers, had children and attended late for the first test. CONCLUSIONS: Women at highest risk of default from follow-up cytology tend to be young, smoke, lack post-secondary education, and have defaulted from a previous surveillance appointment. Tackling default will require development of targeted strategies to encourage attendance and research to better understand the reasons underpinning default.

Sherman, S. M., E. L. Moss, P. Pearmain and C. W. Redman (2016). "**Colposcopists' experiences of HPV Test of Cure for the follow up of cervical intra-epithelial neoplasia**." Eur J Obstet Gynecol Reprod Biol **201**: 42-45.

OBJECTIVE: To survey lead colposcopists in England to explore their views on the recently introduced HPV Test of Cure (TOC) following treatment for cervical intra-epithelial neoplasia (CIN) and to determine the extent to which it has impacted their clinical practice and affected their patients. METHODS: An online survey was sent to lead colposcopists across England. Questions were asked focusing on the clinicians' confidence in the ability of TOC to guide follow up in various clinical scenarios and how the implementation of TOC had changed patient management. RESULTS: There was a 50% (N=88) response rate. 90% of respondents indicated they were happy with the new procedure. In the follow-up questions, 20% indicated they were uncomfortable with the procedure when it was applied to women who were CIN2+ with incomplete excision at the endocervical margin. Open-ended questions elicited positive aspects of TOC including reduced follow-up, increased reassurance for patients and clinicians and a faster return to the call-recall system. Negative observations included concerns around HPV positive cases, possible false negatives and anxiety in those women who were originally subject

to the pre-TOC guidelines and were now returned to call-recall "earlier" than originally indicated to them. 11% of respondents also indicated they work around the new guidelines to some extent. CONCLUSION: Although clinicians are on the whole positive towards the introduction of TOC, concerns were raised which centre primarily around those patients with CIN2+ combined with positive endocervical margins, issues related to HPV positive cases and the possibility of a false negative HPV result. The possibility of patient anxiety due to return to routine screening earlier than originally expected was also identified as a concern.

Sherman, S. M., E. Nailer, P. Pearmain, R. W. Todd and C. W. Redman (2016). "**Disclosing the results of the invasive cervical cancer review to patients: a survey of lead colposcopists across England**." Cytopathology **27**(4): 237-241.

OBJECTIVE: To survey lead colposcopists to explore the extent to which patients are currently being invited to discuss the results of their invasive cervical cancer review, the reasons why this might not be happening and the clinician experience. METHODS: An online survey was sent to lead colposcopists across England. They were asked whether they offered the review to patients, if they did how they did so and what their experience was and if they did not, why not. RESULTS: There was a 68.5% (N = 122) response rate, with 53% of respondents currently offering the review meetings. Patients were predominantly invited to the review meeting face to face and clinicians' experiences were mixed with a variety of positive and negative aspects of the meetings given. For those clinicians not currently offering a review meeting, there were a variety of reasons: 25% cited a lack of awareness of the guidelines, 19% time constraints, 12% a fear of causing additional distress and 2% a fear of litigation. Open-ended responses demonstrated a considerable amount of misunderstanding about the process. CONCLUSION: Despite National Health Service Cervical Screening Programme guidelines, not all clinicians offer review meetings to patients and those who do offer them do not always offer them to all women. Patient research needs to be conducted to explore the value of the meetings further, and there is a need to do more to engage clinicians in the process.

Simonella, L. and K. Canfell (2013). "**The impact of a two- versus three-yearly cervical screening interval recommendation on cervical cancer incidence and mortality: an analysis of trends in Australia, New Zealand, and England (vol 24, pg 1727, 2013)**." Cancer Causes & Control **24**(11): 2035-2035.

Smart, L. M. (2016). "**The BAC recommended code of practice for cytology laboratories participating in the UK cervical screening programmes 2015 - an introduction**." Cytopathology **27**(1): 5-7.

Smart, L. M., M. Buchan, A. J. Cropper, P. A. Cross, K. J. Denton, A. F. Mutch and A. Wilson (2016). "**BAC recommended code of practice for cytology laboratories participating in the UK cervical screening programmes 2015: a secondary publication**." Cytopathology **27**(1): 8-34.

Spencer, A. M., L. Brabin, S. A. Roberts, J. Patnick, P. Elton and A. Verma (2016). "**A qualitative study to assess the potential of the human papillomavirus vaccination programme to encourage under-screened mothers to attend for cervical screening**." J Fam Plann Reprod Health Care **42**(2): 119-126.

BACKGROUND: Coverage of the UK National Health Service Cervical Screening Programme is declining. Under-screened women whose daughters participate in the human papillomavirus (HPV) vaccination programme could be stimulated to attend. We investigated whether factors associated with the vaccination programme changed mothers' intentions for future screening. METHODS: Questionnaires were sent to mothers of girls aged 12-13 years across two North

West primary care trusts (n=2387) to assess the effect of the HPV vaccination programme on screening intentions. This identified mothers whose intentions had changed. Consent was sought to contact them for a semi-structured interview to discuss their screening intentions. Key themes were identified using framework analysis. RESULTS: 97/606 women responding to the questionnaire had changed their views about cervical screening. 23 women were interviewed, 10 of whom expressed a positive change and 13 no change. Most had discussed the vaccine information, including cervical screening, with their daughters. Mothers who made a positive change decision recognised their daughters' risk of cervical cancer, the need for future screening, and the importance of their own example. In this way daughters became 'significant others' in reinforcing their mothers' cervical screening motivation. CONCLUSIONS: A daughter's invitation for HPV vaccination instigates a reassessment of cervical screening intention in some under-screened mothers.

Spencer, A. M., L. Brabin, A. Verma and S. A. Roberts (2013). "**Mothers' screening histories influence daughters' vaccination uptake: An analysis of linked cervical screening and human papillomavirus vaccination records in the North West of England**." European Journal of Cancer **49**(6): 1264-1272.

Aim: Achieving high human papillomavirus (HPV) vaccine coverage is important because cervical screening coverage is declining. As key decision makers, mothers' experiences of, and participation in, the cervical screening programme could affect vaccination consent. We investigate whether mother's screening history influences daughter's participation in the HPV vaccination programme. Methods: Mothers' cervical screening records from the National Health Authority Information System were linked to the daughters' HPV vaccination records from the Child Health System in North West England by address. Odds ratios for daughter's vaccination were computed using Logistic Regression, adjusting for age, Primary Care Trust and vaccine cohort (AOR). Results: Daughters in both the routine and catch up programmes were more likely to have initiated vaccination and completed the course if their mothers had attended screening. The association was strongest when mothers had attended within the last 5 years (AOR in routine group: 3.5 (95% confidence interval (CI) 3.1-4.0) for initiation and 2.2 (1.6-2.9) for retention). Mothers who had personally decided to cease screening were less likely to have vaccinated daughters than those who had ceased for medical indications. Daughters were more likely to have been vaccinated if their mothers had received an abnormal smear result. Conclusions: Daughter's HPV vaccination uptake was associated with mother's cervical screening attendance. Daughters of mothers who are not engaged with preventive services are less likely to be vaccinated and may be less likely to engage with screening. This makes mothers central to health interventions to promote both cervical screening and HPV vaccination. (C) 2012 Elsevier Ltd. All rights reserved.

Spencer Nee Pilkington, A. M., L. Brabin, A. Verma and S. A. Roberts (2013). "**Mothers' screening histories influence daughters' vaccination uptake: an analysis of linked cervical screening and human papillomavirus vaccination records in the North West of England**." Eur J Cancer **49**(6): 1264-1272.

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Tsiachristas, A., M. Gittins, H. Kitchener and A. Gray (2017). "**Cost-effectiveness of strategies to increase cervical screening uptake at first invitation (STRATEGIC)**." J Med Screen: 969141317704679.

Objective To assess the cost-effectiveness of strategies to increase cervical cancer screening uptake at first invitation (STRATEGIC trial). Methods We performed an economic analysis alongside the STRATEGIC trial, comparing each of seven novel interventions for improving cervical screening uptake with control general practices in Greater Manchester and Grampian (United Kingdom). A template was developed to measure the intervention costs. Trial estimates of screening uptake were combined with data from the literature to estimate healthcare costs of each intervention. The added lifetime costs and quality adjusted life years (QALYs) of attending cervical screening were estimated by a systematic literature review, with relevant results pooled and weighted by study quality. Trial results and estimated lifetime costs and benefits of screening were then combined in a decision analytic model, giving an incremental cost per QALY gained for each intervention. Uncertainty was addressed in probabilistic and univariate sensitivity analyses. Results Intervention costs per screening round per woman attending varied from about pound1.20 (2014 UK) for the nurse navigator intervention to pound62 for the unrequested HPV self-sampler kit. The meta-analysis revealed a lifetime discounted benefit from screening of 0.043 QALYs per woman attending, at an additional lifetime discounted cost of pound234. The incremental cost per QALY gained in all interventions was below pound13,000. Probabilistic sensitivity analyses suggested that only unrequested self-sampling and timed appointments have a high probability of being cost-effective. Conclusions Unrequested self-sampling and timed appointments are likely to be cost-effective interventions. Further research is required on the duration of effects and on implementing combinations of interventions.

Waller, J., M. Jackowska, L. Marlow and J. Wardle (2012). "**Exploring age differences in reasons for nonattendance for cervical screening: a qualitative study**." Bjog **119**(1): 26-32.

OBJECTIVES: To explore differences in barriers to attendance at cervical screening across age groups because coverage of the cervical screening programme in England has been falling, particularly among women in the youngest age group (25-29 years). DESIGN: A qualitative study. SETTING: A university in London. SAMPLE: Professionals working in the screening field (n=12) and women of varying ages who had either never attended for cervical screening or did not attend regularly (n=46). METHODS: In Study 1 we interviewed professionals to elicit their views on the reasons for lower screening attendance in young women. In Study 2, we carried out four focus groups (n=27) and 19 individual interviews with under-screened women to explore their

barriers to attendance. Verbatim transcripts were analysed using Framework Analysis. RESULTS: Reasons for nonattendance were many and varied. Health professionals identified population-level factors, service provision issues, time pressures, risk perceptions, lack of knowledge and psychological barriers. The nonattenders fell into two groups: those who had made an active decision not to take part (who tended to be older), and those who intended to be screened but did not attend (predominantly younger women). Practical barriers were raised more often by younger women whereas older women had more negative attitudes to screening. CONCLUSION: This study provides rich data on the complex reasons why women do not attend for cervical screening. It points to age differences in barriers to screening, and suggests that addressing practical issues such as appointment systems and clinic times may have a positive impact on attendance in young women.

Wedisinghe, L., P. Sasieni, H. Cubie, H. Currie, G. Baxter, A. Wilson, D. Breen, A. Primrose, L. Khalifa, A. McCullough and M. Canham (2013). "**How to increase the cervical screening attendance? Evidence from multiple studies conducted in Dumfries and Galloway Health Board, UK**." Bjog-an International Journal of Obstetrics and Gynaecology **120**: 260-260.

Williams, D., M. Davies, A. Fiander, D. Farewell, S. Hillier and K. Brain (2017). "**Women's perspectives on human papillomavirus self-sampling in the context of the UK cervical screening programme**." Health Expect **20**(5): 1031-1040.

BACKGROUND: Testing for human papillomavirus (HPV) is being incorporated into the cervical screening programme, with the probable future introduction of HPV as a primary test and a possibility of HPV self-sampling. In anticipation of this development, we sought to inform future policy and practice by identifying potential barriers to HPV self-sampling. METHODS: A cross-sectional survey of 194 women aged 20-64 years was conducted. Logistic regression analysis was used to identify determinants of self-sampling intentions. A purposive subsample of 19 women who reported low self-sampling intentions were interviewed. Interviews were framework-analysed. RESULTS: Most survey participants (N=133, 69.3%) intended to HPV self-sample. Lower intention was associated with lower self-efficacy (OR=24.96, P</=.001), lower education (OR=6.06, P</=.05) and lower perceived importance of HPV as a cause of cervical cancer (OR=2.33, P</=.05). Interviews revealed personal and system-related barriers. Personal barriers included a lack of knowledge about HPV self-sampling, women's low confidence in their ability to self-sample correctly and low confidence in the subsequent results. System-related factors included a lack of confidence in the rationale for modifying the current cervical screening programme, and concerns about sample contamination and identity theft. CONCLUSIONS: Insights gained from this research can be used to guide further enquiry into the possibility of HPV self-sampling and to help inform future policy and practice. Personal and system-related barriers including low confidence in the reasons for changing current cervical screening provision need to be addressed, should HPV self-sampling be incorporated into the cervical screening programme.

Woodhead, C., R. Cunningham, M. Ashworth, E. Barley, R. J. Stewart and M. J. Henderson (2016). "**Cervical and breast cancer screening uptake among women with serious mental illness: a data linkage study**." BMC Cancer **16**(1): 819.

BACKGROUND: Breast and cancer screening uptake has been found to be lower among women with serious mental illness (SMI). This study aims to corroborate these findings in the UK and to identify variation in screening uptake by illness/treatment factors, and primary care consultation

frequency. METHODS: Linked population-based primary and secondary care data from the London borough of Lambeth (UK) were used to compare breast and cervical screening receipt among linked eligible SMI patients (n = 625 and n = 1393), to those without SMI known only to primary care (n = 106,554 and n = 25,385) using logistic regression models adjusted first for socio-demographic factors and second, additionally for primary care consultation frequency. RESULTS: Eligible SMI patients were less likely to have received breast (adjusted odds ratio (OR) 0.69, 95 % confidence interval (CI), 0.57 - 0.84, $p < 0.001$) or cervical screening (adjusted OR 0.72, CI: 0.60 - 0.85, $p < 0.001$). Schizophrenia diagnosis, depot injectable antipsychotic prescription, and illness severity and risk were associated with the lowest odds of uptake of breast (adjusted ORs 0.46 to 0.59, all $p < 0.001$) and cervical screening (adjusted ORs 0.48 - 0.65, all $p < 0.001$). Adjustments for consultation frequency further reduced effect sizes for all subgroups of SMI patient, in particular for cervical screening. CONCLUSIONS: Women with SMI are less likely to receive breast and cervical cancer screening than comparable women without SMI. Higher primary care consultation rates among SMI patients is likely a mediating factor between SMI status and uptake, particularly for cervical screening - a service organised in primary care. To tackle health disparities linked to SMI, efforts at increasing screening uptake are key and should be targeted at women with other markers of illness severity or risk, beyond SMI status alone.

Part 2: Bibliography of Speakers

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