Supplementary Literature Review:

Rapid Literature Review:

Does a change in screening interval lead to a subsequent change in uptake?

Produced by: University of Warwick

Authors: Dr Dan Todkill
Rachael Leslie
Dr William Tigbe
Professor Aileen Clarke

Correspondence to: Aileen.Clarke@warwick.ac.uk

Date submitted: 14th August 2013

Warwick Medical School

Table of Contents

EXECUTIVE SUMMARY

BACKGROUND

The question posed in this rapid literature review was does a *change* in screening intervals in any screening programme alter uptake?

METHODS

Search terms were deliberately broad, and combined terms referring to 'screening' and 'intervals, frequency, intervention studies, or frequency' and 'uptake, coverage, policy or patient acceptance'. Reference lists of identified papers were hand searched for other relevant materials.

RESULTS

A total of 15 591 articles were retrieved through the database searches. With duplicates removed 11 270 articles remained. 34 articles were shortlisted. An additional 3 articles were identified through hand-searching references articles identified in the short list. One article described a change in interval and subsequently observed a lengthened screening interval in 35% of women. We were unable however to determine if this would impact on either coverage or uptake, and this is discussed in detail. No articles were identified which met the inclusion criteria.

CONCLUSIONS

This search was unable to find sufficient evidence to support the notion that a change in screening interval would result in a change in uptake of a screening programme.

1. BACKGROUND

There is an on-going debate about what could be considered the 'optimal' screening interval for diabetic eye disease, where screening participants are screened frequently enough to detect disease at an early stage, but not overtly frequently which risks wasted resources for both the health economy and individual patients.

The NHS Diabetic Eye Screening Programme in England is a systematic national population based screening programme that aims to offer annual screening for patients with diabetes above the age of 11, and currently offers screening on an annual basis. A number of studies (1-4) have, however, concluded that the interval between screening appointments could be increased in low risk individuals. Such a scenario could allow the distribution of resources for diabetes care to be more effectively distributed.

In the UK there is a precedent for screening intervals having changed in other screening programmes. In 2003, the frequency of invitation for cervical screening for those aged 50-64 was standardised to every five years in England. In July 2010 Northern Ireland also announced they would change to the same interval as England from 2011 (5). As part of a review in Wales (6) in 2011, a literature search was performed to identify if a change in interval would impact upon coverage (people screened in the population as a proportion of the number of people eligible for that scheme) or uptake (the proportion of people invited for a screening test that are recorded as having had the screening test), but no evidence was found. Globally, there have been a number of examples of screening programmes which have undergone changes in screening intervals. In Sweden the interval for patients with diabetes type 2 and no retinopathy was increased from 2 to 3 years in 2010 (7) and in 1997 the Screening Mammography Programme of British Colombia changed its policy for women aged 50-79 years from annual to biennial mammography in 1997 (8). The interval for Papanicolaou (Pap) testing also changed in the United States; from 1998 to 2002, cervical screening recommendations by various US organisations recommended that screening should being at the onset of sexual activity and continue throughout life, with some organisations recommending annual intervals, and others recommending longer. From 2002 to 2003 the American Cancer Society (ACS) the American College of Obstetricians and Gynaecologists (ACOG) and the United States Preventive Services Task Force (USPSTF) revised guidelines to longer screening intervals, with the USPSTF recommending screening at least every 3 years, while ACS and ACOG tailor

recommendations based on cytology testing method and/or use of ancillary HPV testing in women aged 30 and older (9).

The 4 Nations Study Group is tasked with conducting a review of the National Screening Committee's policy on the Diabetic Eye Screening Programme, and as part of this wider review will assess the evidence for a changing the current frequency of screening from the currently recommended one year interval.

Importantly, there have been concerns expressed that a longer screening interval may convey the impression that visual loss is an unlikely event (10), and as such engender behaviour change which may impact upon uptake rates. An argument has been proposed that from the perspective of individual patients, a practical rationale exists for yearly screening, which is readily understood by patients (11).

This work is analogous to a small but important body of literature which examines patients' perception of risk and how that relates to screening interval or frequency (12, 13) of screening.

If a *change* in screening interval were to precipitate an alteration in uptake levels of screening programmes – either positively or negatively – this would be a key part of any decision to alter decisions regarding changing interval duration of any programme. As such, this rapid, systematic review aims to identify any evidence which suggests that a *change* in screening interval causes any subsequent changes in uptake or coverage of screening programmes.

2. AIMS AND OBJECTIVES

2.1 AIM

To identify literature to answer the below question;

Does changing screening intervals in any screening programme alter uptake?

2.2 OBJECTIVES

Objective 1: To perform systematic searches of the current literature.

Objective 2: To critically appraise the identified current literature

Objective 3: To synthesise the findings of the literature search in a narrative format.

3. METHODS

3.1 Review Question

The structure of the review followed the suggested guidance from the Centre for Reviews and Dissemination (CRD). As suggested by the CRD guidelines (14), where only a few studies were likely to be found, the research question aims to be as inclusive as possible, with broad inclusion categories in terms of population, intervention, outcomes measured and type of study and answer defined aims and objectives. Thus, the *Population, Intervention, Comparator, Outcomes, Study Design (PICOS)* criteria are broad.

Population – no restriction on populations studied will be placed on the inclusion criteria. However, in the narrative, those studies pertaining to the UK population will be highlighted..

Intervention – Studies relating to all forms of screening programmes shall be included.

Comparator / Control Group – Control or comparator groups and study quality will be clearly identified in the analysis, but absence of a control group will not preclude inclusion.

Outcomes – The outcome of the study must provide information on the possible impact of a changed screening interval on uptake or coverage.

3.3 Search Strategy

A systematic literature search was undertaken during April 2013. The following bibliographical databases were searched:

- Medline (OVIDSP),
- CINAHL
- Embase,
- Scopus

Unpublished digital dissertations were searched (through Proquest). Reference lists of identified papers will be hand searched for other relevant material alongside articles which cite identified material. The National Institute of Health Research (NIHR) Health Technology Assessment (HTA) website was also searched for relevant literature.

Individual search strategies were used for each database. The electronic databases were searched using combination of Medical Subheadings (MeSH) and keywords or their respective alternatives in databases held on platforms other than OVID.

Search strategy terms were determined in conjunction with an Information Specialist. Searches were performed to identify literature pertaining to screening OR mass screening AND intervention studies OR interval OR frequency OR interventions AND patient acceptance of health care OR uptake OR coverage OR policy.

No date or language restrictions were applied and search terms were left deliberately broad. Full details can be found in Appendix B.

In those publications which were included, their references were hand - searched and publications which cited the included article were searched using the 'cited by' facility on PubMed Central.

The search strategy and protocol were approved by the expert 4 Nations Study Group.

All identified abstracts from each of the databases were merged together in *Endnote Version 4*. Duplicates were removed from the publications identified using the search strategy using the 'remove duplicates' function of *endnote v4.*

3.4 Study Selection

A two stage selection procedure was undertaken to identify relevant studies. At stage one, one author (DT) and a collaborator (RC) independently completed an initial screening of titles and abstracts of all identified records using the inclusion/exclusion criteria by creating two shortlists. Following this process, shortlists were combined and duplicates were removed to compile a total shortlist of potentially relevant full text publications based on the information provided in their abstracts.

For the second stage, the available full publications were reviewed independently by the author and collaborator in accordance to the inclusion / exclusion criteria. Any differences in opinion were discussed and agreed with the input of a third adjudicator (WT) where required.

3.4.1 Inclusion and Exclusion Criteria

Inclusion and exclusion criteria were pre-determined and checked by the expert Four Nations Study Group.

Inclusion Criteria

- The articles provide information on the effect of changing screening intervals or frequency upon uptake of screening.
- All types of study shall be considered to determine the effects of a changed screening interval, including qualitative work, which may provide information on service users' perceptions of impact on a changed screening interval.

Exclusion Criteria

- Publications that were published in languages other than English.

3.5 Data extraction strategy

As initial scoping searches had not found any relevant material, standardised data extraction sheets were not developed as the authors were unsure of the nature of papers which would be found by the extensive search.

4. RESULTS

4.1 Results of literature search

A total of 15,591 records were identified in the search. The systematic search of the bibliographic databases yielded 11,270 publications (with duplicates removed) and 3 further publications were identified through searching through references or reference made in text to other publications. Details of the number of publications identified from each bibliographic database can be found in appendix A.

At stage one, the author (DT) and a collaborator (RL) independently completed an initial screening of the 11,270 publications against the inclusion criteria based on the contents of the titles and abstracts creating two shortlists. Following this process, shortlists were combined and duplicates were removed to compile a total shortlist of 34 potential full publications based on the information provided in their abstracts.

An additional 3 publications were identified through hand-searching references of included publications. Following consultation between the author and collaborator, a total of 37 publications were identified and full text publications were requested with support from a research assistant. All of these were publications were available to the reviewers.

Figure 2 shows the information flow throughout the different stages of the systematic review.

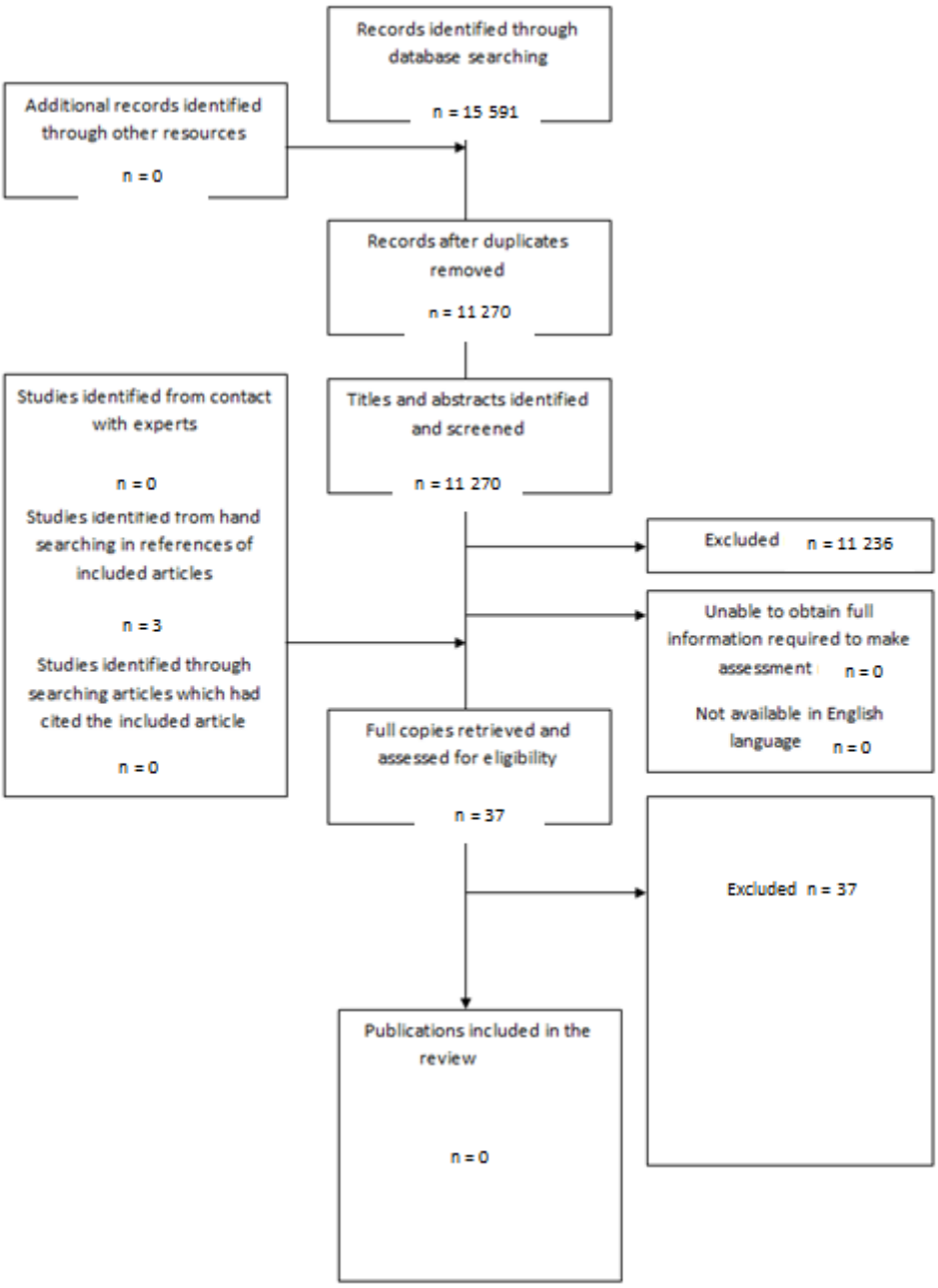

Figure 2: PRISMA flow chart describing information flow through the different phases of the systematic review (15)

4.1.1 Excluded studies

The titles of those papers that were screened but not included and the reason for exclusion are documented in appendix C The most common reason for rejecting papers were; not specifically

about a change in intervals (n = 29), uptake not an outcome (n = 4) or we were not able to extrapolate an effect on uptake (n = 3).

4.1.2 Included Studies

No studies were found which fitted the inclusion criteria of providing information on a *change* in screening frequency or interval actually affecting uptake.

5. DISCUSSION

Based on the capacious search strategy employed in this systematic review we were not able to find evidence that a change in screening interval would lead to a change in in either uptake or coverage.

A number of studies were able to provide relevant information, and are discussed in this section, but did not fully meet the criteria for inclusion.

One such study was conducted by Coldman et.al (8). Coldman and colleagues obtained data for women having undergone breast cancer screening in British Columbia, Canada from the Screening Mammography Programme of British Columbia (SMPBC), the British Columbia Cancer Registry and the Vital Statistics Agency death file (VSA) compiling notifications of death in British Columbia.

The SMPBC was established in 1988 to provide breast screening to eligible women in British Columbia (BC). Women aged 40-79 were eligible to self-refer and received screening mammograms free of charge. From the programme's inception women aged 40-49 were recommended for annual re-screening and received reminder letters to encourage return. In July 1997 the recommendation for annual screening was changed to biennial for women aged 50-79. Women in this age group were permitted to return annually if they wished, but programme information and reminders were altered to reflect the new policy.

The focus of the study was on comparison of breast cancer outcomes participating in the programme before and after 1997 for two groups; ages 40-49 and 50-79 years. The study sample consisted of women aged 40-79 when they were first screened between July 1988 and December 2005, and had data on 658,151 women.

The studies objective was to compare breast cancer outcomes among women subject to different policies on mammography screening frequency. However, reported with the results was information regarding the impact of the change on median time (months) between screens. Comparing pre 1997 and post 1997, the authors observed that a change of policy from annual to biannual mammographic screening, median time between screens was 24 months, but was associated with lengthened screen interval of up to 30 months in 35% of the women, and between 18 and 29 months in 54%. Although it is reported that the median interval between successive mammograms in cohorts with annual screening recommendation was between 13-14 months, it is unclear if similar variation identified in the biennial cohort in screening interval were observed.

No further characteristics of these women were given. Furthermore, this was observational data with no comparative analyses undertaken for those women who underwent annual screening. Importantly, the authors of this review were unable to extrapolate from the information provided what impact changes to the median screening interval would have on either uptake or coverage; hence this study was not included. Importantly, a change in median interval could lead to a delay in people attending screening, without further information it would be an assumption to infer this caused a change in uptake itself.

It is, however, possible that an increase in inter-screen interval could lead to changes in risk perception in the women, which in turn could lead to delay (rather than a fall) in uptake of screening appointments.

There is also no reason to believe that such behaviour is less likely in diabetic retinopathy screening than in breast cancer screening. In a study of patients with diabetes attending diabetic retinopathy clinics across wales, Yeo et al. (16) administered a questionnaire on attitudes to screening and screening interval. The authors report that 85% (n = 507) felt that they should have their eyes screened every year, however, 65% (n = 390) of respondent would support a two or three-year screening programme if there were incontrovertible scientific evidence to supporting this. The authors of this review debated whether to include this study in review, but it did not analyse the effect on uptake. It did however, produce interesting findings; the primary concern of the respondents who objected to longer screening interval was not only the fear of sight loss but also the loss of reassurance that changes can be detected early enough to prevent complications. 67.2% of respondents (n = 403) said that 'eye screening at safe intervals' was 'extremely important' to them. This study was large (1550 questionnaires), with a response rate of 40% (n = 621) and one of the few studies to address opinions on changes in screening intervals. It was however, a self-selected group of patients who attended screening clinics and were willing to complete the questionnaire and therefore, as such the response may be skewed. Nevertheless, any such change in policy should be accompanied by scientifically backed reassurance to people with diabetes that longer screening intervals are safe and acceptable.

There may be a number of possible reasons why we were unable to identify sufficient evidence to support the notion that a change in screening frequency actually results in altered uptake of programmes. Firstly, the protocol specifically looks for evidence relating to a *change* in interval and its consequences. A change in screening interval is a comparatively rare event globally, with the added complication of some alterations to screening interval being a change from multiple disparate intervals decided locally to a uniform national interval, as in the case of cervical screening in the UK

(17). This makes determining overall trends in uptake harder to determine, and proving cause and effect changes between before and after an interval is altered may not be possible.

Another source of information regarding the potential impact of changing a screening interval for a programme is literature which looks at individual's perception of risk and determines if this is associated with the suggested screening interval. These papers were not included in this systematic review, for the reasons that they neither a) directly have a causal effect on either changed uptake or coverage nor b) relate to a *changed* interval. However, importantly, there is the potential that perception may have a non-direct impact on uptake. Risk perception will differ in those with personal or family history of the disease with such individuals failing to adhere to any new increased in frequency interval (18). For this reason, the authors have considered these papers in the context of the discussion, rather than accepting that these answer the review question.

5.1 Interval length associated with risk perception

In order to address low uptake of screening programmes, a number of methodologies have been employed to assess how preferences for participation and weighted perceived benefits relate to procedural characteristics of screening programmes.

One such methodology is the discrete choice experiment. Discrete choice experiments (DCE) are a quantitative technique for eliciting preferences that can be used in the absences of revealed preference data and involves asking individuals to state their preference over hypothetical alternative scenarios, goods or services (19). Dam et al. (13) conducted a DCE amongst 500 screening colo-rectal cancer (CRC) screening naive and 210 participants of a CRC trial. This group were aged between 50-75 year olds and based in the Netherlands. The trial measured a number of attributes, of which preference for screening interval was one. Respondents significantly preferred shorter screening intervals compared to the 10-year screening interval which was suggested in the trial, which was irrespective of health benefits. The authors also link their work with a study by Holloway et al. (12) which demonstrated a preference for shorter (annual or biannual) rather than 3-5 year intervals. This resistance to longer intervals for cervical screening has been replicated in other studies (20). The authors demonstrated the preference for shorter interval lengths may be a result of over-estimation of individual risk, but importantly, that a relatively simple risk communication package could relieve anxiety around lengthened intervals.

Whether these studies could be applicable to other screening programmes is questionable, particularly in the light of different perceived risks for each disease. These DCE's would indicate a preference for shorter intervals, thus a motivation to attend, not vice versa. Limitations of applying such studies to preference for shorter intervals across other screening programmes are, however multiple, and include select populations, different risk perception around cancer and different populations in trials. Based on the limitations, such an argument would be potentially dangerous without further investigation with programme specific research. A number of other studies have been unable to determine preferences for shorter colorectal screening intervals (21, 22).

The issue of risk perception is clearly very relevant to whether or not an altered interval would impact on an individual's perception that the programme was either less or more important. We were unable to find evidence across the screening programs that this is the case.

5.2 Trends in uptake or coverage following changes in screening interval length

A potential method of identifying if changes in screening interval affect participant's behaviour or attitudes such that uptake or coverage is affected is to look at the trends in programmes whereby there has been a change in interval. Cervical screening was introduced in 1964 in England in with cervical smears mostly taken opportunistically, but due to obvious flaws and high mortality rates with cervical cancer screening, this led to the formation of the National Health Service Cervical Screening Programme (NHSCSP), with a systematic process of call and recall, national quality assurance and a population based registry (17). Eventually, local areas were allowed to set a frequency interval of either 3 or 5 years across the age range. Following a significant review in 2003, this practice was standardised across the program with women aged 25-49 years invited every 3 years, and women aged 50-64 invited every 5 years.

A paper published by Lancucki et al. (23) analysed cervical screening coverage data between 1995 and 2005. The authors observed that between 1995 and 2000 coverage remained at about 82% overall, but since 2000 overall coverage had drifted down to just over 80% in 2005, with coverage being related to age; coverage rate is low at ages under 30, is at its highest between ages 35 and 55 then tails off. These patterns were, however, broadly similar across the time period, with the exception that at ages below 50, the rate had been falling but rising in ages above 55. It is worth noting that the screening interval for women under 50 year was not altered in the 2003 review. In a more recent paper by Lancucki et al. (24), the authors analysed coverage data by age over time in six

developed countries (England, Australia, Canada, Denmark, France, Italy and Sweden), focussing on women in the age group 25-29. Each of these countries has individually determined screening intervals (Australia 2 y, Canada 1 -3 y, Denmark 3 y, France 3 y, Italy 3 y and Sweden 3-5 y*)*. The authors found that coverage fell in most countries; in three of them more than 5 percentage points, and whilst overall coverage rose in two countries during the period, the rise was not as steep in the youngest group of women. The authors conclude that there is a general trend in developed countries towards lower coverage in young women (25-29 year olds) but are unable to identify an underlying cause. The authors propose a number of possible reasons; principally local financial or practical reasons such as charging in Sweden, lack of national campaigns (Australia) at the onset of screening. . This discussion has been included here as, if this in indeed a general trend – although only the younger group has been analysed in the paper by Lancucki et.al, and not specific to countries such as England where there has been a change in screening interval, it would be difficult to ascribe such a change to altered perception of risk due to a changed interval, and thus extrapolate a resultant reduction in either coverage or uptake.

5.3 Strengths and Limitations of the This Review

5.3.1 Strengths

The main strength of this review is a systematic approach and a priori determined methodology that were applied to the research question formulation (including PICO domains), and inclusion/exclusion criteria, The purpose of such systematic approach was to minimize the risk of bias at all stages of the review process. For example, the searches were not limited by language or time of publication and covered multiple major electronic databases and alternative sources (e.g., hand search, relevant websites). The study selection was performed by independent reviewers using a priori developed and piloted forms to minimize errors or inaccuracies in data. Inclusion criteria was sufficiently broad (in terms of study design and populations) to ensure that any research which answered the review question would be idenitified.

5.3.2 Limitations

Main limitation of this review rests upon the inability to identify any evidence which fitted the inclusion criteria. There could be a number of reasons for this; Firstly, the protocol specifically looks for evidence relating to a *change* in interval and its consequences. A change in screening interval is a comparatively rare event globally, with the added complication of some alterations to

screening interval being a change from multiple disparate intervals decided locally to a uniform national interval, Also, to determine if uptake (or coverage) has been affected, robust data collection schemes must be in place. This reason would not account however for why qualitative research would not be conducted. Again, the difficulty lies in identifying work which would describe the actual perception of a *change* in interval, rather than people's perceptions of risk associated with different intervals. We have attempted to address this by introducing some of this work in the discussion. Another possibility is that the search terms were not sensitive enough to identify any evidence. This review had, however, capacious search terms, and all authors conducted rapid searches with alternative search terms and databases but remained unable to identify evidence.

6. Conclusions

We conducted a large systematic review which had deliberately adopted a capacious search strategy as it was considered at the outset of the project that finding evidence that a *change* in screening interval would cause a change in uptake levels in any screening programme would be difficult. We were unable to identify sufficient evidence from this search strategy which would support the notion that a change in screening interval would lead to a change in uptake. However, such a change in screening interval should consider beliefs and perceptions of different parts of the population and device communication mechanisms to support adherence to the new programme.

Appendix A: Number of publications identified from each bibliographic database

Table 1: Number of articles identified from each bibliographic database

Database	Number of Abstracts
Medline (OVID)	5937
EMBASE 1980 onwards	7491
SCOPUS	1652
CINAHL	419
ProQuest	80
Health Technology Assessments	8
Other Sources	4

Appendix B: Search Strategy Terms

Table A: Search strategy terms		
Rows combined individually with 'OR'. Results of individual Row searches (Rows A, B and C) combined with 'AND'		
ROW A	**ROW B**	**ROW C**
(screen* or screening).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]	intervention studies.mp. or exp Intervention Studies/	exp "Patient Acceptance of Health Care"/
exp Mass Screening/	(interval* or frequen* or intervention*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]	(uptake or coverage).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
		polic*.mp.

Appendix C: Rejected Articles with Reasons

Article	Title	Justification
Anttila, A et.al 2007(25)	"Cervical cancer screening programme in Finland with an example on implementing alternative screening methods	Not specifically about a change in intervals
Armfelt, L et.al 2012 (26)	"Attendance to mass screening program among young women with cervical carcinoma in Finland	Not specifically about a change in intervals
Brouwers, M et.al 2011 (27)	"Effective interventions to facilitate the uptake of breast, cervical and colorectal cancer screening: an implementation guideline	Not a primary analysis
Canfell, K et.al 2004 (28)	"The predicted effect of changes in cervical screening practice in the UK: results from a modelling study	Compares different experiences of different countries with different screening intervals, not changing from one interval to another
Canfell, K et.al 2006 (29)	"Cervical cancer in Australia and the United Kingdom: comparison of screening policy and uptake, and cancer incidence and mortality	Compares different experiences of different countries with different screening intervals, not changing from one interval to another
Chua et.al 2005 (30)	"Knowledge, perceptions and attitudes of Hong Kong Chinese women on screening mammography and early breast cancer management	Not specifically about a change in intervals
Coldman et.al 2008 (8)	"Impact of changing from annual to biennial mammographic screening on breast cancer outcomes in women aged 50-79 in British Columbia"	Unable to extrapolate effect on uptake
Yeo et al. 2012 (15)	"Diabetic retinopathy screening: perspectives of people with diabetes, screening intervals and costs of attending screening."	Did not analyse the effect on uptake
Creighton et.al 2010 (31)	"Cervical cancer screening in Australia: modelled evaluation of the impact of changing the recommended interval from two to three years	Does not explicitly discuss the impact that the change has on uptake
Dam et.al 2010 (13)	"What determines individuals' preferences for colorectal cancer screening programmes? A discrete choice experiment	Not specifically about a change in intervals
Dervan, E et.al 2008 (32)	"Factors that influence the patient uptake of diabetic retinopathy screening	Not specifically about a change in intervals
Dickinson, J et.al 2002 (33)	"Cervical screening: time to change the policy	Not specifically about a change in intervals
Eaker et.al 2001(34)	"Attitudes to screening for cervical cancer: A population-based study in Sweden	Not specifically about a change in intervals

Eaker et.al 2001 (35)	"Reasons women do not attend screening for cervical cancer: a population-based study in Sweden	Not specifically about a change in intervals
Fahs et.al 1996 (36)	"Cost-effective policies for cervical cancer screening: An international review	Not specifically about a change in intervals
Fiebig et.al 2009 (37)	"Decisions about Pap tests: What influences women and providers?	Not specifically about a change in intervals
Halabi et.al 2000 (38)	"Factors associated with repeat mammography screening	Not specifically about a change in intervals
Jensen, H et.al 2010 (39)	"User satisfaction is influenced by the interval between a health care service and the assessment of the service	Not about a change in *screening* intervals
Koopmanschapet.al 1990 (40)	"Cervical-cancer screening: attendance and cost-effectiveness	Not specifically about a change in intervals
Leese et.al 2008 (41)	"Screening uptake in a well-established diabetic retinopathy screening program: the role of geographical access and deprivation	Not specifically about a change in intervals
Linsell et.al 2010 (42)	"Women's preferences for the delivery of the National Health Service Breast Screening Programme: a cross-sectional survey	Not specifically about a change in intervals
Mandelblatt, J et.al 2009 (43)	"Effects of mammography screening under different screening schedules: Model estimates of potential benefits and harms	Not specifically about a change in intervals
Marcus and Crane 1998 (44)	"A review of cervical cancer screening intervention research: Implications for public health programs and future research	Not specifically about a change in intervals
Meissner et.al 2010 (45)	"Too much of a good thing? Physician practices and patient willingness for less frequent pap test screening intervals	Not referring to effect of a change on uptake
Randall, D et.al 2009 (46)	"Annual or biennial mammography screening for women at a higher risk with a family history of breast cancer: prognostic indicators of screen-detected cancers in New South Wales, Australia	Not referring to effect on uptake
Ritvo et.al 2012 (18)	"Beliefs about optimal age and screening frequency predict breast screening adherence in a prospective study of female relatives from the Ontario site of the Breast Cancer Family Registry	Not referring to a effect on uptake
Schabert et.al 2008 (47)	"Five-year routine cervical cancer screening rates and intervals in a US health plan	Not specifically about a change in intervals
Tabar, L et.al 1987 (48)	"What is the optimum interval between mammographic screening examinations? An analysis based on the latest results of the Swedish two-county breast cancer	Not referring to a change in uptake

	screening trial	
Wai, E et.al 2005 (49)	"Comparison of 1- and 2-year screening intervals for women undergoing screening mammography	Does not explicitly discuss effect on uptake
Zapka, J et.al 1991 (50)	"Interval adherence to mammography screening guidelines	Not specifically about a change in intervals
Holloway et.al 2003(12)	Cluster-randomised trial of risk communication to enhance informed uptake of cervical screening	Not specifically about a change in intervals
Whynes, DK et.al 2007 (51)	Why do women participate in the English cervical cancer screening programme?	Not specifically about a change in intervals
Gyrd-Hansen and Sogaard J 2009 (21)	Analysing public preferences for cancer screening programmes.	Not specifically about a change in intervals
Marshall DA et.al 2009 (22)	How do physician assessments of patient preferences for colorectal cancer screening tests differ from actual preferences? A comparison in Canada and the United States using a stated-choice survey.	Not specifically about a change in intervals
Hawley ST et.al 2008 (52)	Preferences for colorectal cancer screening among racially/ethnically diverse primary care patients.	Not specifically about a change in intervals
Cantor SB et.al 2002 (53)	Psychological benefits of prostate cancer screening: the role of reassurance.	Not specifically about a change in intervals
Hunt et.al 1999 (54)	Outcome analysis for women undergoing annual versus biennial screening mammography: a review of 24,211 examinations	Uptake not an outcome

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