TITLE: Addressing the crisis of GP recruitment and retention: A qualitative review

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## Abstract

**Background** The number of general practitioners (GPs) and training places in general practice are declining and an increasing problem to retain GPs in their practices.

**Aim** To identify evidence on different approaches to retention and recruitment of GP such as intrinsic vs extrinsic motivational determinants.

**Design and Setting** Synthesis of qualitative and quantitative research using seven electronic databases from 1990 onwards (Medline, Embase, Cochrane Library, HMIC, Cinahl, Psych Info and the TRIP database).

**Method** Databases were searched from 1990 onwards. We used a qualitative approach to review the literature on recruitment and retention of the GP. Studies included were English-language studies from OECD countries. The title and abstracts of 98 articles were reviewed and analysed by the research team.

**Results** Some of the most important determinants to increase recruitment in primary care were early exposure to primary care practice, role models, the medical environment, the fit between skills and attributes and intellectual content and a significant experience in a primary care setting. Factors which seemed to influence retention were subspecialisation and portfolio careers where doctors might gain skills in a range of specialities and practices and job satisfaction. The most important determinants of recruitment and retention were intrinsic and idiosyncratic factors such as recognition rather than extrinsic factors such as income.

**Conclusion** While the published evidence related to GP recruitment and retention is limited and most focused on attracting GPs to rural areas, we found that there are clear overlaps between strategies to increase recruitment and retention. Indeed, the most influential factors are idiosyncratic and intrinsic to the individuals in nature.



**Keywords**

General practice, recruitment, retention, intrinsic motivation, job satisfaction


*Section: How this fits in*

In order to support the work of NHS England and Health Education England on the development of The Five Year Forward view, the Department of Health commissioned a review of the evidence of the 10 Point Plan from the Policy Research Unit in Commissioning and the Healthcare System. The review examined the evidence on general practitioner recruitment and retention determinants. The review found that intrinsic and idiosyncratic factors such as job satisfaction were more important than extrinsic factors such as financial incentives.

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## INTRODUCTION

The UK government and professional bodies have become increasingly concerned about declining numbers of GPs. The reasons for this are thought to be related to problems in training, lowering GP morale, increasing workload pressures on practices, challenges of changing roles, and reductions in pay[1-4].

The number of GPs per 100,000 head of population across England declined from 62 in 2009 to 59.5 in 2012[5]. Despite Department of Health policy to increase GP training numbers in England to 3,250 per annum, GP recruitment has remained persistently below this target, at around 2,700 per annum and there has been a gradual decline in the percentage of students choosing general practice as a first choice since 2005[6]. Despite a recruitment record of 2,989 in 2015-2016, Health Education England (HEE) missed their recruitment goal of 3,250 new GP trainees[7]. While applications for GP post-qualifying have substantially increased in 2016, the problem remains in some areas such as the North East, North West and Midlands[7, 8]. This reduction is set against an increasing GP workload due to changing health needs and policies designed to develop more primary and community based health care[9-12]. Additional pressure arises from an increase in numbers of GPs leaving practice including an increase in those considering practising abroad[13, 14].

Together the under recruitment and increased propensity to leave are key factors leading to the current GP shortage. In order to address this, in 2015 NHS England – working with HEE, The Royal College of General Practitioners and the British Medical Association - published the 10-point plan[15] and then in 2016, the General Practice Forward View[16], both proposing strategies to increase recruitment and reduce turnover in general practice through specific initiatives and further investment in general practice.

As part of the development work for reviewing the 10 Point Plan and NHS England's strategy the Policy Research Unit in Commissioning and the Healthcare System was asked to review the existing evidence on GP recruitment and retention[17]. The review explored the main dimensions related to recruitment and retention of GPs to identify the intrinsic and extrinsic motivational factors related to career choices and retention. This paper reports on the main findings of the review.

## METHOD

In order to identify relevant evidence, we undertook a structured review (See table 1 for search terms) that synthesised the evidence from reviews on primary care physician recruitment and retention from countries with similar health systems to the UK (e.g. Canada, Australia) and UK studies specifically examining GP recruitment and retention and GP training. We included articles published in English or French from 1990 onwards.

Following an initial review, the terms were searched as keywords (appearing in title, abstract, subject and keyword heading fields) and also mapped against Mesh subject headings where applicable to ensure comprehensive coverage. The databases searched for our study were Medline, Embase, Cochrane Library, Health Management Information Consortium (HMIC), Cumulative Index to Nursing and Allied Health Literature (Cinahl), Psych Info and the Turning Research Into Practice (TRIP) database (Internet-based source of evidence-based research). The literature search included all journal articles, systematic

reviews, meta-analyses, review articles, reports and grey literature (See table 2 for search results). We have also expanded our data collection to undertake more in depth searching of the grey literature and conduct hand searches of key journals to provide a more comprehensive analysis and evidence base for policy development. The search was restricted to Organisation for Economic Co-operation and Development (OECD) countries and selected articles generally come from countries with similar healthcare system such as Canada and Australia.

From results, duplicates were deleted and a basic initial weeding process was undertaken to exclude irrelevant papers. The research team reviewed the titles and abstracts of identified papers to select relevant studies for inclusion in the review. We reviewed original research papers and empirical studies (see Figure 1 Flow chart diagram) both from the UK and from other countries where relevant.

## RESULTS

This paper reports the findings of the review and draws on evidence from international reviews of the evidence relevant to primary care physician recruitment and retention and findings from primary studies on GP recruitment and retention from the UK. There was a degree of overlap between studies that examined retention and which also studied recruitment. However, in order to set the evidence on recruitment and retention determinants these are presented separately.

### Recruitment in general practice

Studies that examine specific recruitment strategies for the GP workforce are scarce[18]. Our review suggests that most studies on primary care physician (e.g. GP, family doctor, etc) recruitment have predominantly focused on remote rural locations. However, we identified a number of studies that examined the determinants influencing recruitment that would be relevant to general practice. These can be characterised in terms of how they relate to the individual, institutional and professional contexts of recruitment.

In a study of career choices Shadbolt and Bunker[19] presented determinants that are mainly intrinsic to the individual. These Intrinsic factors include physician's self-awareness of their skills and the factors associated with career orientations or choices. These are influenced by demographic variables, lifestyle orientation and the opportunities for learning and educational development[19-22], suggesting that medical graduates primarily look for a career that is stimulating and interesting. One study found that medical students were more attracted toward 'biomedical' or technical forms of medical practice as oppose to a more holistic form of medicine[20].

Medical students exposure to, and experience of general practice has an important effect on preferences for a general practice career. We identified a number of studies that highlighted the important influence on recruitment of the workplace experience stressing the need for a positive experience from interactions with members of the profession, the length of time spent in general practice, the quality of the practice and the dedication of generalists' faculty[18-20, 23-28]. In particular, positive experiences were linked to an increased likelihood to choose general practice – especially when the experience occurred at the pre-clinical or early stage[24, 28].

Similarly, Campos-Outcalt et al[29] found that the best strategies to enlarge the proportion of medical students choosing generalist careers included reform of the medical school curricula with emphasize on generalist training, increasing the size of generalist faculty, and requiring

clinical training in family practice. There is some evidence to show that implementing effective medical school curricula in primary care and establishing primary care "honours" tracks, developing or expanding primary care fast-track programmes, and curricula proposing portfolio careers and profile of new skills[19, 27, 29, 30] influences students' career choices. Currently, medical training delivered in general practice and the proportion of medical school budget made available for its teaching is lower than the time dedicated to, and resources available for teaching related to secondary care[2].

Two studies focused on the effect of the modification of admission criteria to identify potential students who are more likely to choose primary care specialisation as part of student selection. They proposed integrating assessing the community of origin and previous experience or interest in people and social concerns and discussing future speciality choices into the admission process[31, 32]. Providing financial support to students choosing poorly recruiting areas of practice has been shown to have a negative impact on retaining those students when in practice[33]. However, increasing student debt may make such schemes more attractive but further research is required[19, 26].

Factors influencing recruitment are related to the clinical content, perceived lifestyle, and work context. The clinical content of the role is one of the most important factors influencing career choices[22]. Given this dominance, the negative view of general practice – that it is less intellectually stimulating - held by medical students may explain the lack of interest in this career choice[19, 22]. However, Chellappah and Garnham[20] concluded that students at the end of their training have a positive image of general practice suggesting that student views change during medical training. However, choices regarding eventual speciality are taken earlier in medical school before these more positive views are formed.

Work climate and work context, such as the support from colleagues, autonomy, flexibility and independence, proximity with patients, the continuity of care and health promotion are also key factors affecting recruitment [19, 20, 22, 34, 35]. Compatibility with family life and the medical breadth of the discipline also positively influence choosing general practice[35]. Shadbolt and Bunker[19] have suggested that more attention should be paid to the fit between skills and attributes with intellectual content and demands of primary medical care by emphasising the lifestyle issues (flexibility, work-life balance), social orientation (patient focused, community-based) and the opportunity to gain significant and varied clinical experience in the primary care setting.

**Retention of General Practitioners**

Few studies explicitly examined how to retain primary care physicians in practice. In the UK, the numbers of GPs registering to work abroad has significantly increased in the past three years and GPs intention to quit practice has been increasing - from 8.9% in 2012 to 13.1% in 2015 amongst GPs under 50 years-old and from 54.1% in 2012 to 60.9% in 2015 amongst GPs aged 50 years and over[14]. Retention can be influenced by a variety of intrinsic and extrinsic factors including remuneration, income and salary retention scheme, job satisfaction, and career pathway and portfolio[15, 16, 36].

While remuneration and retention schemes such as increases in salary or lump sum payments, are used by government to retain doctors, there is little evidence of the positive and effective impact of these schemes. While low pay might be a source of dissatisfaction toward the job[26], the evidence suggests that increases in income would not compensate for other sources of job dissatisfaction such as workload[36].

Job satisfaction and job dissatisfaction are significant predictors of GP retention and turnover[37, 38], reflecting the findings of research in the wider management and organisational behaviour literature[39, 40]. Job satisfaction varies from time to time within individual's career stages. Therefore, it is important to understand both the determinants influencing job satisfaction and dissatisfaction but also the factors that increase strain in the workplace and in general practice. Job satisfaction and dissatisfaction are related to three factors: job stressors (e.g. workload), job characteristics and attributes (e.g. job autonomy), and other conditions (e.g. practice geographical location).

Job dissatisfaction is most influenced by work related variables. In particular, these include increased workload intensity and volume to meet the requirements of external agencies, having insufficient time to do the job justice, increased administration and bureaucracy, increased demand and expectation from patients, increasing work complexity, lack of support from colleagues, lack of professional recognition and long working hours[14, 38, 39, 41]. More recently adverse publicity by the media, changes imposed from local primary care organisations, and insufficient resources within the practice have all increased job dissatisfaction[13]. There is evidence to show that increased work stress and work intensity leads "high strain" GPs reporting higher levels of anxiety, depression and dissatisfaction than "low strain" GPs and that the health impacts of stress remained outside of work, which in turn, could increase job dissatisfaction and intention to quit the profession[42, 43].

Job satisfaction is also influenced by expectations about future events[44]. If doctors perceive that their workload will not reduce, and that demands will always increase, it is likely that they will feel more overwhelmed and less satisfied with their job and thus, more likely to quit. Therefore, feeling more stressed, disillusioned, and overwhelmed amplifies the negative portrayal of GPs in the media and by government, further negatively affecting GP's spirit and professional identity[45].

There is some evidence that job autonomy, the variety of work, feeling of doing an important job, social support, and a good practice environment positively affect job satisfaction[14, 38, 46]. However, GP surveys suggest that a number of these attributes have changed -- autonomy in deciding how to do their job and what work to do, variety of work and flexibility of working between 2012 and 2015[14].

Changes to general practice over the last 10-15 years have been substantial and job dissatisfaction could be a result of the changing roles necessitated by professional and organisational changes[37, 46]. However, job satisfaction is also influenced by a number of other factors such as the local practice context, work-life flexibility, personal development and the emotional impact of working as a GP[41, 46]. Wordsworth et al suggested that enhancing the patient care aspects of GPs work is more likely to act as a key for retention while lack of consultation on changes can lead to dissatisfaction[47, 48]. Flexibility and part-time working have always been seen as factors that make general practice a more attractive working environment although this is increasingly seen to be less relevant[47, 49-51].

Mentorship schemes and opportunities to develop portfolio careers would be welcome at every stage of the GP career, not just for senior doctors or towards the end of working lives[19, 25, 28]. Two papers suggest that a wider choice of long-term career paths such as subspecialisation and portfolio careers (e.g. dermatology, paediatrics) are important for both the recruitment and retention of GPs. It is also suggested that increasing their satisfaction of intellectual and altruistic needs and functional flexibility within their practice could improve satisfaction and fulfilment and consequently GPs retention[19, 28]. Providing learning and

development activities such as developing management skills could support GP recruitment and retention providing an opportunity for students to map out development pathways and provide variety within a physician's role.

## DISCUSSION

*Summary*

Three elements are relevant to GP recruitment: individual, institutional, and professional factors. In addition providing students with appropriate opportunities for contact with, and positive exposure to, general practice and general practitioners is critical as well as widening opportunities for students and GPs so that junior doctors' specialisation choices can reflect more individual student characteristics. The main determinants of retention are job satisfaction (vs dissatisfaction), the influence of job stress, job attributes and characteristics and other conditions such as the geographical location of the practice. All seem related to career pathways and portfolio.

*Strengths and Limitations*

Overall the published evidence in relation to GP recruitment and retention is limited and mostly focuses on attracting GPs to rural areas – particularly in Australia. The review shows an overlap in the determinants of recruitment and retention[46]. Despite this, the evidence does suggest that there are some potential factors that may usefully support the development of specific strategies for supporting the recruitment and retention of GPs. These are summarised in table 3 and 4. While most strategies proposed by the 10-Point plan and the General Practice Forward View are not based on strong evidence, some determinants might help with the GP workforce crisis[15, 16].

*Implications for Research and or Practice*

Newton et al found that retirement at 60 years old was a goal for both happy GPs in order to do other things or because they feel they have "done their bit", as well as those GPs who no longer had the resilience to cope with work stress[49]. In their study, Roos and colleagues showed that while 83.7% of GP trainees and newly qualified GPs would choose to be a physician again, only 78.4% would choose general practice as a specialisation[35]. One clear message from the literature is that expectations about the future – whether as a new GP or future developments in general practice, affect both recruitment and retention[44, 52].

One area not fully explored in the literature identified for this review was the recruitment policy of medical schools given that that there are career choice determinants influencing the recruitment of GPs in medical school. It would be interesting in the future to explore the role of health policy on specific recruitment policy of medical schools and this is likely to be influenced by the findings of the joint HEE and Medical Schools Council review chaired by Professor Val Wass[53, 54,] . One area suggested by the General Practice Forward View is recruitment at the international level. International recruitment was out of the scope of this review. A post-hoc analysis shows a lack of evidence of the long-term beneficial effects of such recruitment strategy[55-59]. While short term policy such as international recruitment and financial bonus and other incentive package respond to immediate needs they are not long-term solutions.

## CONCLUSION

Based on our review of the evidence we would support strategies that provide long-term investment in general practice. Current proposals to increase the proportion of NHS funding in primary care are therefore welcome. The evidence suggests that providing the right environment and opportunity for GPs to focus on supporting patients as medical

professionals is crucial, requiring strategies that reduce workload while retaining the core attributes of general practice. However, strategies should also include opportunities for GPs to develop wider interests and skills. From this review there appear to be three key lessons that should underpin national and local policies: Develop strategies to develop both recruitment and retention simultaneously.

1. Review the curricula in medical schools and emphasise the importance of exposure to general practice
2. Job satisfaction is the main predictor of retention and is influenced by workload stress and future anticipation and thus strategies that reduce workload
3. Financial inducements (golden handcuffs) are not necessarily effective

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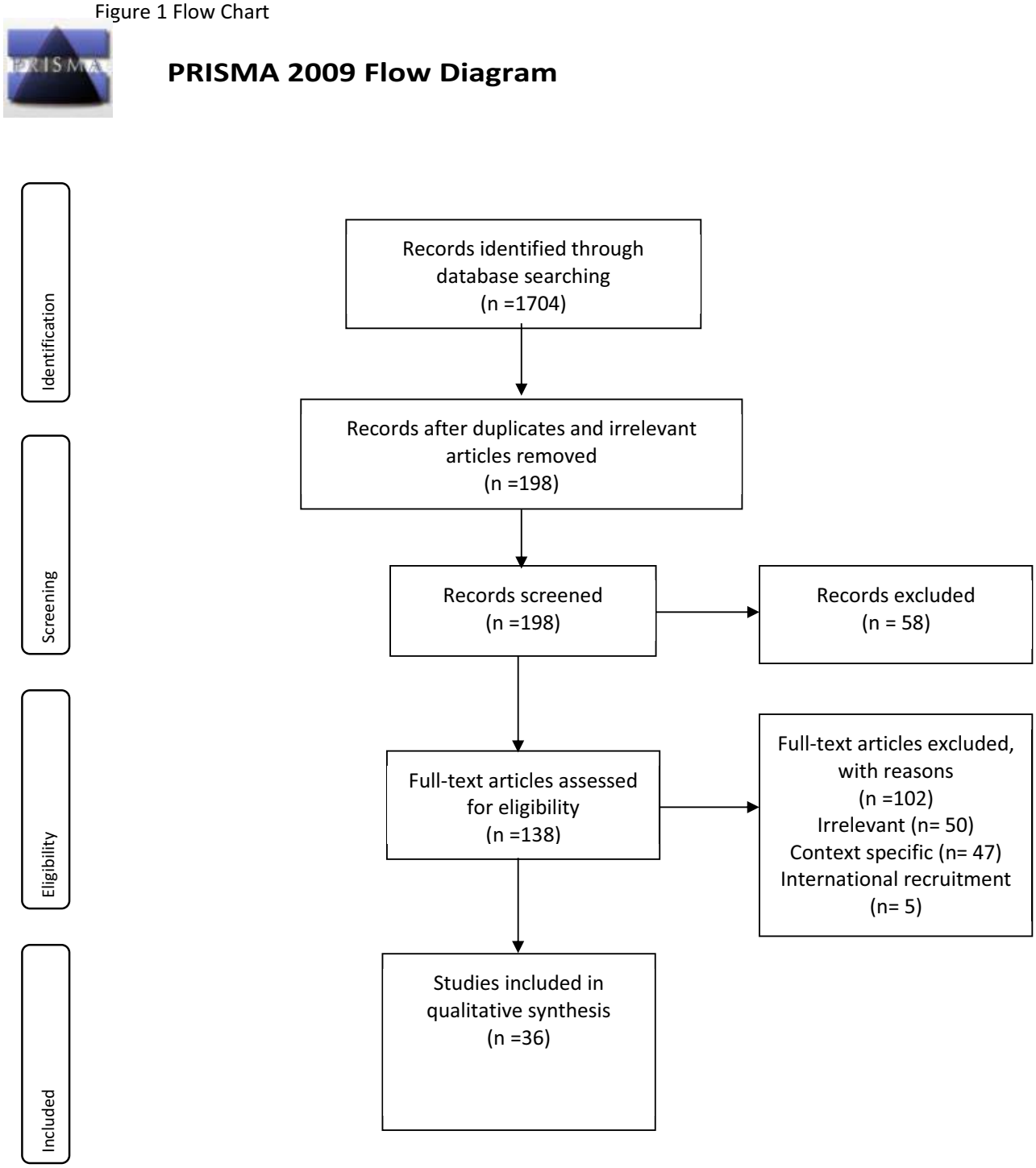
FIGURE

Figure 1 Flow Chart



TABLES

**Table 1 Search terms**

| **Key terms** | **Combined with:** |
|---|---|
| **General practitioner** | Recruitment |
| **GPs** | Recruitment strategy* |
| **General practice** | Personnel recruitment |
| **Family practitioner*** | Employment |
| **Family practice** | Career choice |
| **Family physician*** | Personnel turnover |
| **Family doctor*** | Motivation |
| **Primary care physician*** | Retention |
| **Primary care doctor*** | GP retention |
| **Primary care practitioner*** | Retirement |
| | Early retirement |
| **The * means truncation.** | |

**Table 2 Search results**

| **Database** | |
|---|---|
| **Medline, Embase & Cochrane (reviews, meta-analyses)** | 129 refs |
| **HMIC (reports, policy documents and grey literature)** | 270 refs |
| **Medline, Embase & Cochrane (journal articles)** | 879 refs |
| **Psych Info** | 351 ref |
| **Cinahl** | 43 refs |
| **TRIP** | 30 refs |

**Table 3 Summary of evidence**

| | 10 Point Plan | Evidence GP literature | |
|---|---|---|---|
| Recruitment | **1. Promoting general practice** | No clear evidence | - Enhancing the status, contribution, career advancement and rewards of Primary Care Practitioners<br>- Role models<br>- Medical environment important |
| | **2. Improving the breadth of training**<br>*(for candidates seeking to work in geographies, where it is hard to recruit trainees)* | Some evidence for both candidates seeking to work in geographies, where it is hard to recruit trainees and for GP trainees seeking to work everywhere. | *Exposure to general practice:*<br>- Early exposure / preregistration house officers scheme<br>- Workplace experience and interaction with members of the profession<br>- Length of time spent in general practice rotation<br>- Ensuring that the rotations are of high quality with dedicated generalists faculty<br>*Curricula modifications:*<br>- Effective medical school curricula in primary care<br>- Establish primary care 'honours' or 'scholars' tracks<br>- Develop or expand primary care fast-track programs<br>- Subspecialisation, portfolio careers and profile of new skills<br>*Recruitment / admission:*<br>- Modification of selection criteria |
| | **3. Training hubs** | Some evidence in the rural training and context literature | *Rural training, rural context literature*:<br>- Familiarity with community health resources, sociocultural awareness in patient care, community participation and assimilation, and identifying and intervening in the community's health problems |
| | **4. Targeted support** | Some evidence in the rural training and context literature but no clear evidence in general practice | - Link choice of career in primary care to loan forgiveness<br>- Funding in primary care research<br>- Increase and assure funding for fellowship training in primary care<br>- Direct training funds to schools with track records of producing graduates in primary care |
| | Other | | *Determinant factors in specialisation choice:*<br>- Fit between skills and attributes w. intellectual content and demands of the specialisation<br>- Stimulating and interesting<br>- Lifestyle factors (flexibility, work-life balance, quality of life)<br>- Social orientation and desire a varied scope of practice<br>- Significant experience in the primary care setting |
| Re | **5. Investment in retainer** | No clear evidence | *Widening the scope of remuneration and contract conditions:* |

| | 10 Point Plan | Evidence GP literature | |
|---|---|---|---|
| | **schemes** | | - Reduce the income differential between general practice and hospital work<br>- Remove the disincentives for less than full-time employment widening of the employment mechanisms open to GPs such as authority-organised salaried schemes |
| | **6. Improving the training capacity in general practice** | No clear evidence | Subspecialisation and portfolio careers where doctors might gain skills in a range of specialities and practices some or all of them at any one time. |
| | **7. Incentives to remain in practice** | No clear evidence | |
| | **8. New ways of working** | No clear evidence | *Varying time commitment across the working day and week:*<br>- Part-time, job share; temporary, and short-time available, whatever a GP's employment status and career stage.<br>*Offering a wider choice of long-term career paths:*<br>- Locum and associate positions equal to full-time principal posts<br>- Activities such as research and training in management skills<br>- A part-time educational post, or hospital attachment<br>- Job mobility as a way to progress (a more positive vision of mobility). |
| | Other | Evidence | *Increased satisfaction (factors):*<br>- Job autonomy / Diversity / Variety<br>- Social support, relationship and collaboration with colleagues/patients<br>- Academic hospital and centres / teaching medical students and advanced students<br>*Decreased satisfaction (factors):*<br>- Too many working hours, low income / compensation / workload / not enough time / high demands / lot of paperwork / little free time<br>- Lack of support / lack of colleagues<br>- Lack of recognition<br>- Bureaucracy / practice administration |

**Table 4 Characteristics of included reviews on determinant of recruitment and retention of GPs**

| Authors | Year | Countries | Article type | Topic | Method | Relevance | Quality |
|---|---|---|---|---|---|---|---|
| **Buchbinder SB, et al.**[45] | 2001 | USA | Cohort study | Primary care physician, job satisfaction and turnover | Questionnaire survey | WEAK: Cohort from the USA and data from 1987 to 1991 | GOOD |
| **Buciuniene I, et al.**[41] | 2005 | Lithuania | Original research | Healthcare reform and job satisfaction | Self-administrated anonymous questionnaires | WEAK: GPs from and policy from Lithuania | AVERAGE/WEAK: Cross-sectional and statistical analyses simplistic (e.g. no regression only correlations) |
| **Bustinza R, et al.**[33] | 2009 | Canada | Cohort study | Training programme, GP retention in rural area | Used of secondary data and questionnaires | AVERAGE: Canada has a similar primary care context but the study was in a rural context. | GOOD |
| **Campos-Outcalt D, et al.**[29] | 1995 | USA | Review / Quality assessment | Curricula, role models, research support career choice | Literature search : MEDLINE, PsychInfo, Current contents, Expanded academic Index | AVERAGE, since the article present three element influencing career choice but the article is quite old. | AVERAGE: The methods are very detailed. Very few articles were included in the results section due to the lack of quality articles fitting their 70 criteria. |
| **CFWI**[50] | 2014 | UK | Review / Report | GP workforce | N/A | HIGH | GOOD: because it gives an overview of the GP workforce in the UK |
| **Chellappah M, Garnham L.**[20] | 2014 | UK | Original research | Medical student attitude towards general practice | Questionnaire design | HIGH | WEAK: Not generalizable (specific to one college).Measurement scale not used. |
| **Crampton PES, et al.**[21] | 2013 | AU, USA, CA, NZ, South Africa, Japan | Systematic literature review | Undergraduate clinical placements, underserved areas | Databases searches, inclusion and exclusion criteria, data extraction etc. | WEAK | HIGH |
| **Dale J, et al.**[42] | 2015 | UK (West Midlands) | Cross-sectional study | Retention GP | Online questionnaire with free text section | HIGH | GOOD: because it questioned the |

| Authors | Year | Countries | Article type | Topic | Method | Relevance | Quality |
|---|---|---|---|---|---|---|---|
| | | | | | | | proposition that general practice is in crisis. |
| **Dayan M, et al.**[36] | 2014 | UK | Report | GP workforce crisis | N/A | GOOD | AVERAGE: |
| **Doran N, et al.**[46] | 2016 | UK | Mixed-methods research. | Why GPs leave the NHS | Online questionnaire with qualitative interviews | HIGH | GOOD |
| **Evans J, et al.**[51] | 2000 | UK | Cohort study | Medical graduates and flexible /part-time working in medicine | Survey with free-text comment. Reported mainly the qualitative data. | WEAK: medical graduate in general not only future GPs, also the data come from 1977, 1988, and 1993. | AVERAGE: Used mainly qualitative data coming from the free-text comment. The percentage of comment flexible and prat-time is less than 9% for the three cohorts. |
| **Feeley TH.**[52] | 2003 | N/A | Narrative literature review | Retention in rural primary care physicians | N/A | WEAK | WEAK |
| **Geyman JP, et al.**[32] | 2000 | USA | Study | Educating GPs for rural practice | Comprehensive literature search: Medline, Health STAR databases | WEAK but the recommendations are interesting. | AVERAGE/WEAK: Little analysis, only look at programmes |
| **Gibson J, et al.**[14] | 2015 | UK | Report, survey | GP Work/life survey | Questionnaire | GOOD | AVERAGE since it is a report. |
| **Groenewegen PP, et al.**[43] | 1991 | USA | Review of the literature | GP, effective workload, Job satisfaction | N/A | GOOD | AVERAGE: No method but definition and theorisation is interesting |
| **Halaas GW, et al.**[23] | 2008 | USA | Study | Recruitment and retention of rural physicians | Analysed data from a recruitment program | GOOD but the results are link to the rural context | AVERAGE: since no hypothesis, nor hypothesis testing but 37 years trend |
| **Harding A, et al.**[2] | 2015 | UK | Cross-sectional study | Teaching and GP | Review of past national survey and questionnaire survey | GOOD | GOOD |
| **Hemphill E, et al.**[60] | 2007 | AU | Mixed design | GP rural recruitment | Three sources of data collection: GP survey, data collected from a convenient sample of student, and interviews with recruiting agencies | WEAK | AVERAGE |

| Authors | Year | Countries | Article type | Topic | Method | Relevance | Quality |
|---|---|---|---|---|---|---|---|
| **Humphreys J, et al.**[48] | 2001 | AU | Critical review | Rural medical workforce retention | Australian and international database: ATSI Health, Consumer service, AusportMed, Family & Society, etc. | GOOD | AVERAGE: Issues w. method inclusion / exclusion criteria. |
| **Illing J, et al.**[24] | 2003 | UK | Review of evidence | Learning in practice (preregistration house officers) and general practice | Literature search: Embrase, Medline, ERIC, FirstSearch, PsycInfo, www.timelit.org.uk, www.educationgp.com. | GOOD | AVERAGE: methods inclusion and exclusion criteria not presented. |
| **Landry M, et al.**[25] | 2011 | CA | Original study | Recruitment and retention of doctors and local training (Rural) | Short survey | GOOD but the results are link to the rural context | GOOD: Methods well presented, the analyses are adequate. |
| **Lee DM, Nichols T.**[26] | 2014 | USA, CA | Case study, review | Physician recruitment & retention rural and underserved areas | Literature review | WEAK: but suggestions for different factors influencing recruitment and retention | AVERAGE: The review method is described but the case study choice is not explained. |
| **Newton J, et al.**[49] | 2004 | UK (Northern Deanery) | Original study | Job dissatisfaction and early retirement | Qualitative study: Interviews, using a purposefully drawn from seven sub-groups of respondents. | GOOD | AVERAGE: small number of interviewees. |
| **O'Connor DB, et al.**[44] | 2000 | UK (Liverpool) | Preliminary study | Job strain and blood pressure in general practice | Questionnaire and ambulatory blood pressure procedure, | HIGH: relationship between job strain on blood pressure | GOOD |
| **Petchey R, et al.**[22] | 1997 | UK | Original study | Junior doctors' perceptions of general practice as a career | Qualitative study: Interviews, using an heterogeneous sample | HIGH | WEAK: Little theoretical development. |
| **Roos M, et al.**[35] | 2014 | Czech Republic, Denmark, Germany, Italy, Norway, | Original cross-sectional study | Motivation for career choice and job satisfaction: GP trainees and newly qualifies GPS | Questionnaire / Survey | HIGH | GOOD |

| Authors | Year | Countries Portugal, UK | Article type | Topic | Method | Relevance | Quality |
|---|---|---|---|---|---|---|---|
| **Rosenthal TC.**[31] | 2000 | USA | Review | Rural training tracts | N/A | WEAK: but interesting insight | WEAK |
| **Schwartz MD, et al.**[27] | 2005 | USA | Reflexion | Student interest in Generalist career | N/A | HIGH | WEAK: Recommendations without original study nor based on evidence from various articles |
| **Shadbolt N, Bunker J.**[19] | 2009 | Australia | Review | Career choice determinants | N/A | HIGH | WEAK: No method |
| **Sibbald B, et al.**[38] | 2003 | England | National survey | Job satisfaction and retirement | Survey | HIGH | GOOD |
| **Stapleton G, et al.**[61] | 2014 | English speaking countries | Review, ethical criteria | Primary care physicians | Database: web of knowledge | WEAK | AVERAGE: presentation of methods |
| **Van Ham I, et al.**[39] | 2006 | UK, USA, AU | Systematic review | GPs and Job satisfaction | 2 strategies: database + snowball methods | HIGH | HIGH |
| **Verma P, et al.**[18] | 2016 | UK, USA, CA, AU, Japan, NZ, Norway, Chile | Systematic review | Strategies to recruit and retain | Literature search: MEDLINE, EMBASE, and CENTRAL; 1974-2013. | HIGH | HIGH |
| **Williamson JW, et al.**[30] | 1993 | USA | Comparative studies | Primary care, Health systems change | N/A | WEAK | WEAK: No method |
| **Wordsworth S, et al.**[47] | 2004 | UK | Original study | Preferences for general practice jobs | Discrete choice experiment | GOOD | GOOD |
| **Young R, Leese, B.**[28] | 1999 | UK | Discussion paper / review | Recruitment and retention of GP in the UK | Literature search: MED-INE, BIDS-EMBASE, ISS, HELMIS, survey of articles in recent issues of relevant professional journals. | HIGH | AVERAGE: little theoretical development and evidence |