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

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18

19 Abstract

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

22

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

25

26 **Design and Setting** Synthesis of qualitative and quantitative research using seven electronic databases from
27 1990 onwards (Medline, Embase, Cochrane Library, HMIC, Cinahl, Psych Info and the TRIP database).

28

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

32

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

39

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

44

45 **Keywords**

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

47

48 *Section: How this fits in*

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

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

57

58 INTRODUCTION

59

60 The UK government and professional bodies have become increasingly concerned about
61 declining numbers of GPs. The reasons for this are thought to be related to problems in
62 training, lowering GP morale, increasing workload pressures on practices, challenges of
63 changing roles, and reductions in pay¹⁻⁴.

64

65 The number of GPs per 100,000 head of population across England declined from 62 in 2009
66 to 59.5 in 2012⁵. Despite Department of Health policy to increase GP training numbers in
67 England to 3,250 per annum, GP recruitment has remained persistently below this target, at
68 around 2,700 per annum and there has been a gradual decline in the percentage of students
69 choosing general practice as a first choice since 2005⁶. Despite a recruitment record of 2,989
70 in 2015-2016, Health Education England (HEE) missed their recruitment goal of 3,250 new
71 GP trainees⁷. While applications for GP post-qualifying have substantially increased in 2016,
72 the problem remains in some areas such as the North East, North West and Midlands^{7,8}. This
73 reduction is set against an increasing GP workload due to changing health needs and policies
74 designed to develop more primary and community based health care⁹⁻¹². Additional pressure
75 arises from an increase in numbers of GPs leaving practice including an increase in those
76 considering practising abroad^{13,14}.

77

78 Together the under recruitment and increased propensity to leave are key factors leading to
79 the current GP shortage. In order to address this, in 2015 NHS England – working with HEE,
80 The Royal College of General Practitioners and the British Medical Association - published
81 the 10-point plan¹⁵ and then in 2016, the General Practice Forward View¹⁶, both proposing
82 strategies to increase recruitment and reduce turnover in general practice through specific
83 initiatives and further investment in general practice.

84

85 As part of the development work for reviewing the 10 Point Plan and NHS England's strategy
86 the Policy Research Unit in Commissioning and the Healthcare System was asked to review
87 the existing evidence on GP recruitment and retention¹⁷. The review explored the main
88 dimensions related to recruitment and retention of GPs to identify the intrinsic and extrinsic
89 motivational factors related to career choices and retention. This paper reports on the main
90 findings of the review.

91

92 METHOD

93

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

99

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

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

114

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

120

121 **RESULTS**

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

128

129 **Recruitment in general practice**

130 Studies that examine specific recruitment strategies for the GP workforce are scarce¹⁸. Our
131 review suggests that most studies on primary care physician (e.g. GP, family doctor, etc)
132 recruitment have predominantly focused on remote rural locations. However, we identified
133 a number of studies that examined the determinants influencing recruitment that would be
134 relevant to general practice. These can be characterised in terms of how they relate to the
135 individual, institutional and professional contexts of recruitment.

136

137 In a study of career choices Shadbolt and Bunker¹⁹ presented determinants that are mainly
138 intrinsic to the individual. These Intrinsic factors include physician's self-awareness of their
139 skills and the factors associated with career orientations or choices. These are influenced by
140 demographic variables, lifestyle orientation and the opportunities for learning and
141 educational development¹⁹⁻²², suggesting that medical graduates primarily look for a career
142 that is stimulating and interesting. One study found that medical students were more
143 attracted toward 'biomedical' or technical forms of medical practice as oppose to a more
144 holistic form of medicine²⁰.

145

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

154

155 Similarly, Campos-Outcalt et al²⁹ found that the best strategies to enlarge the proportion of
156 medical students choosing generalist careers included reform of the medical school curricula
157 with emphasize on generalist training, increasing the size of generalist faculty, and requiring

158 clinical training in family practice. There is some evidence to show that implementing
159 effective medical school curricula in primary care and establishing primary care “honours”
160 tracks, developing or expanding primary care fast-track programmes, and curricula
161 proposing portfolio careers and profile of new skills^{19, 27, 29, 30} influences students’ career
162 choices. Currently, medical training delivered in general practice and the proportion of
163 medical school budget made available for its teaching is lower than the time dedicated to,
164 and resources available for teaching related to secondary care².

165
166 Two studies focused on the effect of the modification of admission criteria to identify
167 potential students who are more likely to choose primary care specialisation as part of
168 student selection. They proposed integrating assessing the community of origin and previous
169 experience or interest in people and social concerns and discussing future speciality choices
170 into the admission process^{31, 32}. Providing financial support to students choosing poorly
171 recruiting areas of practice has been shown to have a negative impact on retaining those
172 students when in practice³³. However, increasing student debt may make such schemes
173 more attractive but further research is required^{19, 26}.

174
175 Factors influencing recruitment are related to the clinical content, perceived lifestyle, and
176 work context. The clinical content of the role is one of the most important factors
177 influencing career choices²². Given this dominance, the negative view of general practice –
178 that it is less intellectually stimulating - held by medical students may explain the lack of
179 interest in this career choice^{19, 22}. However, Chellappah and Garnham²⁰ concluded that
180 students at the end of their training have a positive image of general practice suggesting that
181 student views change during medical training. However, choices regarding eventual
182 speciality are taken earlier in medical school before these more positive views are formed.

183
184 Work climate and work context, such as the support from colleagues, autonomy, flexibility
185 and independence, proximity with patients, the continuity of care and health promotion are
186 also key factors affecting recruitment^{19, 20, 22, 34, 35}. Compatibility with family life and the
187 medical breadth of the discipline also positively influence choosing general practice³⁵.
188 Shadbolt and Bunker¹⁹ have suggested that more attention should be paid to the fit between
189 skills and attributes with intellectual content and demands of primary medical care by
190 emphasising the lifestyle issues (flexibility, work-life balance), social orientation (patient
191 focused, community-based) and the opportunity to gain significant and varied clinical
192 experience in the primary care setting.

193 194 **Retention of General Practitioners**

195 Few studies explicitly examined how to retain primary care physicians in practice. In the UK,
196 the numbers of GPs registering to work abroad has significantly increased in the past three
197 years and GPs intention to quit practice has been increasing - from 8.9% in 2012 to 13.1% in
198 2015 amongst GPs under 50 years-old and from 54.1% in 2012 to 60.9% in 2015 amongst
199 GPs aged 50 years and over¹⁴. Retention can be influenced by a variety of intrinsic and
200 extrinsic factors including remuneration, income and salary retention scheme, job
201 satisfaction, and career pathway and portfolio^{15, 16, 36}.

202
203 While remuneration and retention schemes such as increases in salary or lump sum
204 payments, are used by government to retain doctors, there is little evidence of the positive
205 and effective impact of these schemes. While low pay might be a source of dissatisfaction
206 toward the job²⁶, the evidence suggests that increases in income would not compensate for
207 other sources of job dissatisfaction such as workload³⁶.

208

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

217
218 Job dissatisfaction is most influenced by work related variables. In particular, these include
219 increased workload intensity and volume to meet the requirements of external agencies,
220 having insufficient time to do the job justice, increased administration and bureaucracy,
221 increased demand and expectation from patients, increasing work complexity, lack of
222 support from colleagues, lack of professional recognition and long working hours^{14,38,39,41}.
223 More recently adverse publicity by the media, changes imposed from local primary care
224 organisations, and insufficient resources within the practice have all increased job
225 dissatisfaction¹³. There is evidence to show that increased work stress and work intensity
226 leads "high strain" GPs reporting higher levels of anxiety, depression and dissatisfaction than
227 "low strain" GPs and that the health impacts of stress remained outside of work, which in
228 turn, could increase job dissatisfaction and intention to quit the profession^{42,43}.

229
230 Job satisfaction is also influenced by expectations about future events⁴⁴. If doctors perceive
231 that their workload will not reduce, and that demands will always increase, it is likely that
232 they will feel more overwhelmed and less satisfied with their job and thus, more likely to
233 quit. Therefore, feeling more stressed, disillusioned, and overwhelmed amplifies the
234 negative portrayal of GPs in the media and by government, further negatively affecting GP's
235 spirit and professional identity⁴⁵.

236
237 There is some evidence that job autonomy, the variety of work, feeling of doing an
238 important job, social support, and a good practice environment positively affect job
239 satisfaction^{14,38,46}. However, GP surveys suggest that a number of these attributes have
240 changed -- autonomy in deciding how to do their job and what work to do, variety of work
241 and flexibility of working between 2012 and 2015¹⁴.

242
243 Changes to general practice over the last 10-15 years have been substantial and job
244 dissatisfaction could be a result of the changing roles necessitated by professional and
245 organisational changes^{37,46}. However, job satisfaction is also influenced by a number of other
246 factors such as the local practice context, work-life flexibility, personal development and the
247 emotional impact of working as a GP^{41,46}. Wordsworth et al suggested that enhancing the
248 patient care aspects of GPs work is more likely to act as a key for retention while lack of
249 consultation on changes can lead to dissatisfaction^{47,48}. Flexibility and part-time working
250 have always been seen as factors that make general practice a more attractive working
251 environment although this is increasingly seen to be less relevant^{47,49-51}.

252
253 Mentorship schemes and opportunities to develop portfolio careers would be welcome at
254 every stage of the GP career, not just for senior doctors or towards the end of working
255 lives^{19,25,28}. Two papers suggest that a wider choice of long-term career paths such as
256 subspecialisation and portfolio careers (e.g. dermatology, paediatrics) are important for both
257 the recruitment and retention of GPs. It is also suggested that increasing their satisfaction of
258 intellectual and altruistic needs and functional flexibility within their practice could improve
259 satisfaction and fulfilment and consequently GPs retention^{19,28}. Providing learning and

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

263

264 **DISCUSSION**

265 *Summary*

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

274

275 *Strengths and Limitations*

276 Overall the published evidence in relation to GP recruitment and retention is limited and
277 mostly focuses on attracting GPs to rural areas – particularly in Australia. The review shows
278 an overlap in the determinants of recruitment and retention⁴⁶. Despite this, the evidence
279 does suggest that there are some potential factors that may usefully support the
280 development of specific strategies for supporting the recruitment and retention of GPs.
281 These are summarised in table 3 and 4. While most strategies proposed by the 10-Point plan
282 and the General Practice Forward View are not based on strong evidence, some
283 determinants might help with the GP workforce crisis^{15, 16}.

284

285 *Implications for Research and or Practice*

286 Newton et al found that retirement at 60 years old was a goal for both happy GPs in order to
287 do other things or because they feel they have "done their bit", as well as those GPs who no
288 longer had the resilience to cope with work stress⁴⁹. In their study, Roos and colleagues
289 showed that while 83.7% of GP trainees and newly qualified GPs would choose to be a
290 physician again, only 78.4% would choose general practice as a specialisation³⁵. One clear
291 message from the literature is that expectations about the future – whether as a new GP or
292 future developments in general practice, affect both recruitment and retention^{44, 52}.

293

294 One area not fully explored in the literature identified for this review was the recruitment
295 policy of medical schools given that there are career choice determinants influencing
296 the recruitment of GPs in medical school. It would be interesting in the future to explore the
297 role of health policy on specific recruitment policy of medical schools and this is likely to be
298 influenced by the findings of the joint HEE and Medical Schools Council review chaired by
299 Professor Val Wass^{53, 54}. One area suggested by the General Practice Forward View is
300 recruitment at the international level. International recruitment was out of the scope of this
301 review. A post-hoc analysis shows a lack of evidence of the long-term beneficial effects of
302 such recruitment strategy⁵⁵⁻⁵⁹. While short term policy such as international recruitment and
303 financial bonus and other incentive package respond to immediate needs they are not long-
304 term solutions.

305

306 **CONCLUSION**

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

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

316

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

322

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330

331

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334

335

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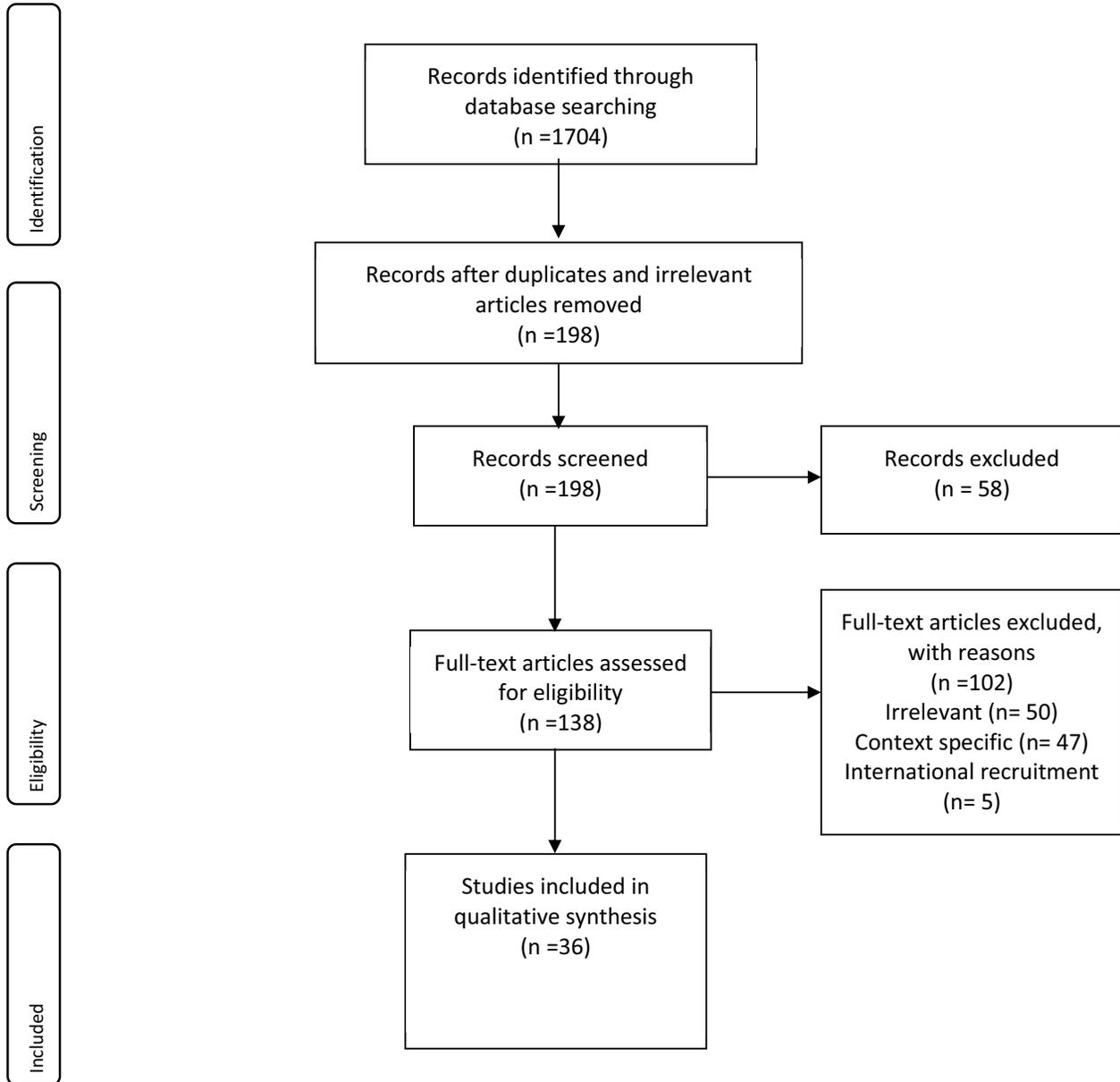
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FIGURE

Figure 1 Flow Chart



PRISMA 2009 Flow Diagram



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	<ul style="list-style-type: none"> - Enhancing the status, contribution, career advancement and rewards of Primary Care Practitioners - Role models - Medical environment important
	2. Improving the breadth of training <i>(for candidates seeking to work in geographies, where it is hard to recruit trainees)</i>	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.	<p><i>Exposure to general practice:</i></p> <ul style="list-style-type: none"> - Early exposure / preregistration house officers scheme - Workplace experience and interaction with members of the profession - Length of time spent in general practice rotation - Ensuring that the rotations are of high quality with dedicated generalists faculty <p><i>Curricula modifications:</i></p> <ul style="list-style-type: none"> - Effective medical school curricula in primary care - Establish primary care 'honours' or 'scholars' tracks - Develop or expand primary care fast-track programs - Subspecialisation, portfolio careers and profile of new skills <p><i>Recruitment / admission:</i></p> <ul style="list-style-type: none"> - Modification of selection criteria
	3. Training hubs	Some evidence in the rural training and context literature	<p><i>Rural training, rural context literature:</i></p> <ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Link choice of career in primary care to loan forgiveness - Funding in primary care research - Increase and assure funding for fellowship training in primary care - Direct training funds to schools with track records of producing graduates in primary care
	Other		<p><i>Determinant factors in specialisation choice:</i></p> <ul style="list-style-type: none"> - Fit between skills and attributes w. intellectual content and demands of the specialisation - Stimulating and interesting - Lifestyle factors (flexibility, work-life balance, quality of life) - Social orientation and desire a varied scope of practice - Significant experience in the primary care setting
R e	5. Investment in retainer	No clear evidence	<i>Widening the scope of remuneration and contract conditions:</i>

	10 Point Plan	Evidence GP literature	
	schemes		<ul style="list-style-type: none"> - Reduce the income differential between general practice and hospital work - 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	<p><i>Varying time commitment across the working day and week:</i></p> <ul style="list-style-type: none"> - Part-time, job share; temporary, and short-time available, whatever a GP's employment status and career stage. <p><i>Offering a wider choice of long-term career paths:</i></p> <ul style="list-style-type: none"> - Locum and associate positions equal to full-time principal posts - Activities such as research and training in management skills - A part-time educational post, or hospital attachment - Job mobility as a way to progress (a more positive vision of mobility).
	Other	Evidence	<p><i>Increased satisfaction (factors):</i></p> <ul style="list-style-type: none"> - Job autonomy / Diversity / Variety - Social support, relationship and collaboration with colleagues/patients - Academic hospital and centres / teaching medical students and advanced students <p><i>Decreased satisfaction (factors):</i></p> <ul style="list-style-type: none"> - Too many working hours, low income / compensation / workload / not enough time / high demands / lot of paperwork / little free time - Lack of support / lack of colleagues - Lack of recognition - 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.
CFWI⁵⁰	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
Dayan M, et al. ³⁶	2014	UK	Report	GP workforce crisis	N/A	GOOD	proposition that general practice is in crisis.
Doran N, et al. ⁴⁶	2016	UK	Mixed-methods research.	Why GPs leave the NHS	Online questionnaire with qualitative interviews	HIGH	AVERAGE: 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 part-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	Article type	Topic	Method	Relevance	Quality
Rosenthal TC. ³¹	2000	Portugal, UK 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