Medical career path decision making: a rapid review

A Scott
C Joyce
T Cheng
W Wang

An **Evidence Check** rapid review brokered by the Sax Institute for the NSW Ministry of Health

August 2013

saxinstitute

This rapid review was brokered by the Sax Institute for the NSW Ministry of Health.

This report was prepared and written by:
Anthony Scott, Catherine Joyce, Terrence Cheng and Wei Wang from the University of Melbourne and Monash University, Australia.

August, 2013.

Enquiries regarding this report may be directed to:
Director
Knowledge Exchange Division
Sax Institute
knowledge.exchange@saxinstitute.org.au
www.saxinstitute.org.au
T: +61 2 9514 5950
F: +61 2 9514 5951

Suggested Citation:
Scott A, Joyce CI, Cheng T, Wang W. Medical career path decision making: an Evidence Check rapid review brokered by the Sax Institute (http://www.saxinstitute.org.au) for the NSW Ministry of Health, 2013.

Contents

1 EXECUTIVE SUMMARY 5

1.1 Aims and background 5

1.2 Findings 5

1.3 Recommendations 6

2 Background and introduction 7

2.1 Aims and questions addressed 8

3 Methods of review and papers retrieved 9

4 Results and analysis of evidence 11

4.1 Can employers influence doctors' career choices? 11

4.2 Can career planning and support influence career development and job satisfaction? 13

4.3 When do doctors make critical career decisions? 13

4.4 What sources and modes of delivery of information influence career choices? 15

4.5 What influences specialty choice? 16

4.6 What influences decisions to work in rural and remote areas? 21

5 Conclusions 23

6 References 24

7 Appendices 30

1 EXECUTIVE SUMMARY

1.1 Aims and background

- The aim of this rapid review is to examine factors influencing the career choices of medical practitioners
- In a context of rapid graduate expansion and more intense competition for pre-vocational and vocational training positions, it is important to understand what evidence is available to inform policy interventions designed to influence career choices, including those specialties and locations which are predicted to be in shortage
- The literature from 2005 was reviewed, with a focus on Australian studies. Twenty Australian studies and 189 overseas studies were found
- The evidence was of low quality. Most studies were either descriptive/qualitative or cross-sectional surveys, with only a handful of poorly designed intervention studies.

1.2 Findings

- Three main groups of factors have been shown to be associated with career choice:
    - the characteristics, skills, and abilities of medical students and graduates
    - the characteristics of undergraduate and postgraduate medical education and training
    - the characteristics of alternative medical careers and jobs
- The preferences of medical students and doctors in training can potentially be influenced by the information they receive and their experiences throughout their training
- The sources of information they rely on are more likely to be informal; from peer groups, supervisors and experience in placements. There is some weak evidence that the quality of supervision is associated with eventual career choices. There is also weak evidence from overseas that data on the availability of positions in each specialty training program and specialty may influence decisions
- The evidence of the impact of more formal career advice and support, and the role of mentoring programs, is non-existent or too weak to make any conclusions
- Employers and government can alter the structure and nature of training and careers, and this can influence the availability and characteristics of career options. For example, Modernising Medical Careers in the UK shortened the length of medical training to accommodate increasing numbers of graduates, but it remains unclear what effect this has had on the quality and cost of training or on career trajectories
- Undergraduate placements can have some influence, especially where the quality of supervision is high and for those placements towards the end of medical school
- The early postgraduate years appears to be the time when most doctors in training decide on their specialty training program in Australia. About 15% report being certain of their specialty at the end of medical school. There is evidence from the UK that those who are certain of their choice early on are highly likely to end up working in that specialty

- Most studies focused on specialty choice. Studies that asked respondents to rate the importance of a list of factors were fairly consistent in their findings. For the factors that were actionable through policy change, work experience and the flexibility of hours were the most highly rated, with financial aspects least highly rated. However, there was some evidence that financial aspects were most important for those who were uncertain about their specialty and for those interested in surgery. The one Australian study that focused more on expected future job characteristics found avoiding on-call work, higher earnings, more procedural work, control over hours and academic research opportunities were important determinants of specialty choice, with on-call work being the most important factor. Though student debt is less of an issue here than in the US, one Australian study found that the importance of earnings in influencing specialty choice was higher for those with more student debt
- The factors influencing career choice vary across specialties. For general practice, there is weak evidence that length and quality of clinical attachments may play a role
- Rural background has consistently been shown to be associated with rural practice from a range of studies across different countries. The influence of rural-based training and educational experiences are also often cited, but the evidence to support this is weak.

1.3 Recommendations

- There is an urgent need to support high quality research and intervention studies of changes in medical education, career information sources, and policies influencing specialty job characteristics on career choices. This requires not only investment in longitudinal data collection that map and follow medical careers, but also investment in the research skills of those undertaking such research
- Any interventions to influence the preferences of junior doctors should take place in the early postgraduate years and should be properly evaluated
- Areas of intervention worth exploring further include:
    - the quality of supervision during training, including the role and nature of training for supervisors
    - providing information on the chances of obtaining a specialty training place
    - the provision of unbiased career information through trusted supervisors
- The strong association of rural practice with rural background suggests a stronger role for considering rural background in medical student selection
- The role and impact of rural-based clinical training needs to be more thoroughly evaluated.

2 Background and introduction

Medical career paths are a key element in determining access to, costs and outcomes of the healthcare system. The career decisions taken by medical practitioners between enrolment in medical school and retirement determine the eventual skills, numbers, distribution and location of practice of qualified medical practitioners and, to an extent, of other health professionals who work with them (e.g. nurses and allied health practitioners). The structure of careers, including the structure and length of training, and the structure of promotion and rewards at different career stages, can also provide incentives to influence not only career choices and trajectories, but also the costs and quality of care provided (Prendergast, 1999).

Given the current consensus on the maldistribution of medical practitioners across specialties and geographic locations, policy makers wish to know how they can influence career paths to lead to a more efficient and equitable distribution. Neither the preferences of medical graduates nor the supply of training places reflects or is responsive to population health needs (Health Workforce Australia, 2013). This is especially the case in Australia, as record numbers of medical graduates are entering the training system and opportunities exist to persuade them to work in specialties and areas of shortage.

Increases in the numbers of medical graduates will not address maldistribution. This is likely to lead to oversupply unless other policies are also implemented to change career paths and persuade medical practitioners to work in specialties and areas of likely future shortage. There will be more competition for training places that will lead to junior doctors increasing their effort and/or spending longer in the system as salaried non-specialist doctors. As with the large expansion of graduates in the UK that led to Modernising Medical Careers, large-scale graduate expansion in Australia will alter the career trajectories of junior doctors, as bottlenecks and increased competition in the training system mean that all doctors cannot progress as quickly to specialist status, and some may not progress at all (Marshall, 2007). How these junior doctors will be supported requires an understanding of when and how career decisions are made.

How medical practitioners make career decisions is based on a complex mix of their own skills and abilities, the availability of career opportunities, and information about the expected future characteristics and economic returns of different career paths. Career and specialty decisions are dynamic in that individuals consider not only their current situation and past experiences, but also broader life cycle factors, including family factors and expected future job characteristics across alternative career paths. The availability and characteristics of different career paths and job opportunities are determined by employers (e.g. healthcare organisations and governments) and the opportunities for self-employment. Regulation has a strong role to play in the medical care career structure and labour market. For example, employer bargaining agreements define the structure of salary scales, promotion, and the flexibility that employers have to attract and retain medical practitioners by offering higher remuneration, better working conditions, or different types of jobs.

Well-functioning labour markets also rely on good quality information about careers and the jobs on offer to both candidates and employers. Markets with poor or inaccurate information will lead to employers and job candidates potentially making the wrong decisions. In addition, historically embedded earnings differentials between different career paths, peer networks, professional status, and the culture of medical practice also have a strong role to play in medical career choice. Only some of the above factors can be influenced by policy in the short term.

2.1 Aims and questions addressed

The aim of this rapid review was to examine the literature on the factors influencing the career choices of medical practitioners. The results emphasise the existing Australian literature, set in the context of the larger overseas literature. The following seven questions were explicitly addressed in this review. There is some overlap between the questions, with some being general (Q1) and others referring to more specific career stages (e.g. Q6 and Q7). Some of the evidence reviewed is applicable to more than one question.

Question 1
What evidence is there that doctors' (or medical students') career choices can be influenced by their employer (or potential employer)?

Question 2
What evidence is there that career planning, advice and support (including development of career frameworks or matrices) has been successful in influencing career development and job satisfaction?

Question 3
When in their career pathway do doctors or medical students make critical career decisions (considering the full career spectrum from medical student to prevocational training, vocational training and beyond)?

Question 4
What sources of information (formal and/or informal) have been shown to have the most influence on doctors' or students' career choices?

Question 5
What modes of delivery are the most effective in conveying career information to doctors or students, e.g. web/smart phones, face-to-face, case studies, forums, self-assessment tools, etc?

Question 6
Focusing specifically on making decisions about vocational training pathways:

a) What factors influence the decision to enter a particular specialty?
b) For those specialties that are perceived to be less popular (see Appendix), what factors influence the decision to enter these particular specialties?
c) How can less popular specialties be promoted to be more attractive?

Question 7
Focusing specifically on making decisions to work in rural and remote areas:

a) What factors influence doctors to practise in rural and remote locations?
b) When in their career pathway do doctors make decisions to practise in rural and remote locations?

3 Methods of review and papers retrieved

The following databases were searched to identify published literature: EconLit, Social Science Citation Index, Medline, Business Source Complete and PsycINFO. The databases were queried using both free text keywords and subject heading searches using the following strategy:

1. Doctor OR medicine OR medical OR physician, AND
2. Career AND (pathway OR development OR support OR planning OR framework OR advice OR choice OR information OR decision)
3. (Specialty OR specialism OR speciality) AND (choice OR decision).

The search was limited to studies published from 2005 onwards. Hand searches were conducted using review papers that were recently published to further uncover studies that were not identified in the database search.

In addition to the published literature, a search of the Australian grey literature was conducted to identify other surveys and reports that were relevant. This consisted of publications and reports published by Health Workforce Australia, Australia's Health Workforce Online website, Australian Primary Health Care Research Institute website, the Medical Students Outcomes Database website, and the Medicine in Australia: Balancing Employment and Life (MABEL) website.

Initial search results were examined in terms of their titles and abstracts. Studies that were included for more detailed review were:

- Existing literature reviews
- Qualitative and quantitative Australian studies
- Quantitative overseas studies.

Qualitative overseas studies (e.g. interviews/focus group papers) were excluded from the review given their usually small sample size and different and specific context, making them much less relevant to the Australian setting. Opinion pieces and editorials were also excluded.

The PDFs of all included papers were coded by assigning them to the seven review questions that are in scope. In the event where there are papers that cover multiple topics, these were assigned to more than one question. The coding was double checked by TC and WW for accuracy. AS and CJ then used the coding to summarise the papers in the results section.

The quality of the included studies was assessed in terms of their design. The empirical studies were classified into:

1. **Descriptive/qualitative studies.** These studies used focus groups or interviews on usually small samples and were generally considered to be low quality
2. **Cross-sectional surveys.** These studies undertook surveys that prospectively asked medical students about factors influencing their intentions, or retrospectively asked those already in specialty training or qualified doctors what factors influenced their specialty choice. Most of these studies were conducted in relation to specific specialties. These studies were generally considered to be of low quality. Those studies that conducted multivariate analysis in an attempt to focus on the strongest associations with career choices were of higher quality. Risk of bias in these studies was assessed by whether the study had discussed representativeness of the survey

3. **Intervention studies.** These studies described and evaluated the effects of an intervention. Generally, intervention studies are of higher quality than descriptive/qualitative studies and cross-sectional surveys. Of these studies, before and after studies or cross-sectional comparisons were the weakest design and randomised controlled trials were the strongest design. Higher quality studies also examined actual career choices rather than attitudes or intentions as primary outcomes. Risk of bias was assessed in terms of the presence and characteristics of a control group and selection bias, as many interventions involved the students or doctors choosing to participate in a program or intervention.

The results of the review for each question begin with the Australian studies, which are discussed in detail. All Australian empirical studies are summarised in Tables in Appendix 2. Australian literature reviews are summarised in the text. Overseas studies were briefly summarised in the text and discussed in more detail if they showed different results or used more robust methods than the Australian studies. If there were no Australian studies addressing a specific question, then overseas studies were briefly summarised. Overseas studies were not summarised in Tables as most were descriptive in nature (e.g. surveys) and therefore of low quality. Combined with their non-Australian context, little additional information would be forthcoming.

Table 1 shows the search results. Of the 19,471 studies, 228 PDFs were retrieved that were of relevance. Of these, 19 were literature reviews. Of the remaining 209, 20 were Australian studies and 189 were from overseas.

Table 1: Literature search results

Database name	Dates covered	Date searched	References
EconLit	2005–current	20/06/2013	174
Social Science Citation Index	2005–current	20/06/2013	1199
Medline	2005–current	10/06/2013	17,333
Business Source Complete	2005–current	14/06/2013	759
PsycINFO	2005–current	14/06/2013	6
TOTAL unduplicated EndNote refs			**19,471**

Though not in the scope of this review, we also briefly searched for evaluations of career choice interventions from other occupations. Our first impressions were that the quality of the literature was no better than what was found in our review, though a more rigorous review of this much larger literature is needed to confirm this.

4 Results and analysis of evidence

4.1 Can employers influence doctors' career choices?

Question 1: What evidence is there that doctors' (or medical students') career choices can be influenced by their employer (or potential employer)?

Little is known about whether employers have been able to influence the career choices of doctors. This does not of course mean that employers cannot influence career choices, but just that the evidence for this is of very low quality. Most research is from descriptive/qualitative interviews or cross-sectional surveys. There are a small number of intervention studies, but these are of low quality.

There are several recent reviews of the literature that cite the range of factors that have been reported to have influenced career choices in medicine (Dohn, 1996; Kashiwagi et al., 2013; Lyons, 2013; Phillips et al., 2009; Rabinowitz et al., 2008b; Stagg et al., 2012; Straus et al., 2006; Thistlethwaite et al., 2007). These factors can be broadly classified into three categories (Table 2):

1. The characteristics, skills, and abilities of medical students and graduates
2. The characteristics of undergraduate and postgraduate medical education and training
3. The characteristics of alternative medical jobs.

Table 2: Factors associated with career choices in medicine

Characteristics of students and graduates	Characteristics of education and training	Job characteristics
1. Age 2. Gender 3. Rural background 4. Personality 5. Attitudes and values 6. Work-life balance preferences/family factors 7. Socio-economic background 8. Personal interests 9. Skills, abilities, aptitudes 10. Peer and social networks	1. Amount of exposure to different specialties 2. Quality of training and supervision 3. Role of mentors and supervisors 4. Career information and support (e.g. workshops, information) 5. Education debt (cost of training) 6. Structure and regulation of training 7. Number and distribution of training places	1. Expected future earnings 2. Procedural work 3. Continuity of care/type of patients seen 4. On-call commitments 5. Hours of work 6. Opportunities for academic work/ intellectual stimuli 7. Reputation/status among peers 8. Reputation/status among community 9. Opportunities for self-employment/ autonomy

The majority of studies included in the review have examined choice of specialty, often with a focus on psychiatry, primary care or surgery. Most of the literature also focuses on the characteristics of education and training. There is almost no literature on the impact of career advice, or on how career information can be best delivered. There is little literature on the influence of the expected characteristics of specialty jobs and careers themselves.

Of the above influences, only (2) and (3) are amenable to direct influence by employers, such as hospitals and healthcare organisations. Employers must work within current regulations, training frameworks and employment agreements. They have some influence over some job characteristics, career planning and support, and the nature of postgraduate training. However, the structure and characteristics of postgraduate training are also influenced by medical specialist colleges.

Governments and medical associations have a broader influence on the whole range of factors, including remuneration, the structure of training, the structure of career advancement and promotion, location of training (e.g. rural clinical schools and private sector), funding of training (e.g. regulation of medical school fees and subsidies), and the funding of postgraduate training places.

For example, one instance of wholesale change to the structure of postgraduate training was Modernising Medical Careers (MMC) in the UK National Health Service (NHS). This was designed in response to an earlier expansion of medical graduate numbers that led to an oversupply of hospital doctors in training (Senior House Officers) and non-specialist positions who could not obtain a specialist training place. MMC attempted to introduce a more structured and focused training program to shorten the length of medical training to get doctors into independent practice earlier. This was done within a challenging context of NHS reform, increased NHS funding and the European Working Time Directive, which was shortening working hours for all hospital doctors. A focus on training and less time spent on service delivery for junior doctors also meant that consultants had to play a greater role in service delivery and supervision while being required to reduce their working hours. In specialist training, the distinction between basic and advanced training was removed ('run-through' training) so specialist training could be completed earlier. There were general concerns about the impact of these reforms on the quality and cost of training.

The failure of the national centralised application system for specialist training positions (Medical Training Application Service) in 2007 led to a fundamental review of MMC through a government inquiry (Collins, 2010; Delamothe, 2008; Tooke J et al., 2008). The system was perceived to place less attention on academic and exam performance and experience, and more on competency-based assessment, and selection was widely regarded as unfair. The system also led to doctors having to choose their specialty much earlier than they felt able to, with a perception that the new training structure was less flexible.

There is little evidence of the impact of MMC on career choices. The level of competition for specialist training places remains high and many doctors are not able to attain consultant status. In 2007, about 40% of doctors applied for but did not get a specialty training place in England (Tooke J et al., 2008). Data are now published on competition ratios for each specialty as an important piece of career information for prospective applicants. There are also strong incentives to develop other non-consultant types of job for hospital doctors. These types of jobs already exist but need to be made more attractive by employers. In the NHS, the large expansion in graduate numbers has not therefore led to consultant jobs for all of these graduates, a previously common expectation among those choosing a career in medicine. There is no evidence of the effects on applications for medical degrees, or on exits from the NHS, either into other occupations or to other countries. Given the larger number of doctors unsuccessful in gaining specialty training positions, the old non-specialist and non-training hospital doctor grades (e.g. staff specialist and associate specialist, equivalent to career medical officer positions in Australia and 'hospitalists' in the US) were consolidated into a new job role of 'specialty doctor'. This included a new employment contract for this post and additional funding for CPD to enhance its status and attractiveness.
www.medicalcareers.nhs.uk/postgraduate_doctors/sas_doctors.aspx

Surman et al. (2013) examined whether MMC was associated with more certainty in the career choices of junior doctors, given that they were required to choose their specialty much earlier than previous cohorts. Comparing pre- and post-MMC cohorts, they showed that levels of certainty about specialty choice had increased after MMC, with 38% being 'definite' about their specialty choice one year after graduation, up from 26 per cent. Three years after graduation, certainty had increased from 41% to 64% (Surman et al., 2013). In addition, graduates in their first postgraduate year reported more job enjoyment and improved lifestyle after MMC compared to those before MMC (Lambert et al., 2013). There were no changes in their attitudes towards their training experiences.

4.2 Can career planning and support influence career development and job satisfaction?

Question 2: What evidence is there that career planning, advice and support (including development of career frameworks or matrices) has been successful in influencing career development and job satisfaction?

No Australian studies were found about the role of career planning and support on career choices for medical students or doctors. A number of studies were found from overseas, but these were largely descriptive and did not evaluate the impact on career choice. There are also several medical career advice guides available that provide general information for tutors and supervisors (Chambers et al., 2006; Elton, 2006; Elton et al., 2008), as well as specific career planning tools aimed at doctors that provide general information and/or advice on how to undertake career planning (see Appendix 3 for a sample of medical career planning websites).

Several overseas studies have reported a demand for improved career advice. A large scale survey of about 25,000 medical graduates from the Medical Careers Research Group in the UK reported that about 96% of doctors in their early postgraduate years agreed or strongly agreed that careers advice was important. Demand for careers advice was highest among those whose first specialty preference was surgery, obstetrics and gynaecology, and anaesthetics, and was lowest for psychiatry and pathology. However, only about 30% felt that they had been given useful career advice since graduation. Those with surgery and obstetrics and gynaecology as a first preference were more likely to report receipt of useful advice, and those in public health and psychiatry were least likely to report that they had received useful advice. For those between three and 11 years after graduation, 38% felt they had not received useful career advice after graduating (Lambert et al., 2007). No information was gathered in this study about the types or sources of careers advice, or of the format in which graduates would like to receive careers advice.

More resources for career advice were made available after the introduction of MMC by the UK NHS, given that junior doctors were required to choose their specialty much earlier (Lambert et al., 2007; Mair et al., 2012). Formal guidance on careers advice was issued, including recommendations that those giving careers advice were to be trained in order to provide unbiased advice (Davison et al., 2006; Department of Health, 2005). While the MMC program in the UK has implemented formal careers advice programs during this stage of training, little information could be found on its impact . Evaluations of the NHS Medical Careers website were carried out in 2010 and 2012. The most recent examined the visibility, utilisation and benefits of the site for users and potential users (Mellors-Bourne, 2012). No evaluation of the relationship between the site and career development or job satisfaction has been reported. The 2012 evaluation involved an online survey of 360 registered users and 908 potential users (volunteer participants were reached through advertisements via medical education providers and other organisations). About two-thirds of foundation program trainees, who are considered the primary audience for the site, were found to be aware of the site and almost 60% had used it. About 25%

of users accessed the site via a smart phone or tablet, and this was projected to rise. User ratings of the site were positive overall, with users finding it relevant and useful. The report recommended exploring additional services, such as interactive content including social media and a "*medical careers app*" (Mellors-Bourne, 2012).

In the context of MMC, Davison et al. (2006) found high satisfaction scores for a formal career counselling service, but this service was not mentioned as influential in a follow-up survey two years later. One study showed that the lowest scores given for quality of career advice were medical schools, college mentors, and postgraduate deaneries, with the highest scores given to informal advice from immediate supervisors, who were also the most frequent source of advice (Goodyear et al., 2007). No information was provided about the reasons why the quality of advice differed. An evaluation report on the new two-year postgraduate foundation program indicated that, despite perceived improvements in the provision of career information and advice such that most receive career advice and find it useful, there was still a need for improvement, particularly in relation to the quality of the information (Collins, 2010). There is a lack of clarity as to what types of information are needed, and data on competition ratios and employment prospects are not systematically collected. The report also found that there was consensus that career advice should be given early. Large numbers of graduates continue to apply for oversubscribed training places, such that at the time of application for advanced training some have to switch specialty. The report describes the current resources, which include information on websites of training providers, publications by the UK Department of Health, and careers events organised by employers. The report recommended that careers information:

> "…*must be easily accessible, simple to understand and contain transparent data on each specialty, including competition ratios and a potential applicant's 'likelihood of success'*." (Collins, 2010)

A small study of recent medical graduates in Saudi Arabia found that a minority (44% of men and 32% of women) expressed a desire to attend a careers advice workshop (Mehmood et al., 2013). When asked about the usefulness of different sources of career advice, higher ratings were given to "*the academic office*", "*the website*", and "*publications and web-based resources*", while lower ratings were given to "*special interest group sponsored panels*".

Compulsory career counselling is a part of medical school accreditation in Canada. A survey in a medical careers advice program in Newfoundland found that about 80% of medical students used the website-based resources, with about 80% of those who used it finding it helpful (Harris et al., 2012). This study is also useful as it examines participation rates across 12 different career counselling activities. The highest participation rates were for 'career nights', 'shadowing', and information sessions for new clerks. However, this study was descriptive and did not evaluate the impact of this on actual career choices.

4.3 When do doctors make critical career decisions?

Question 3: When in their career pathway do doctors or medical students make critical career decisions (considering the full career spectrum from medical student to pre-vocational training, vocational training and beyond)?

There is limited evidence from Australia regarding the timing of actual career decision making. Most evidence relates to stated intentions at different time points. Certainty of preferences increases throughout medical training as trainees are exposed to different information and experiences.

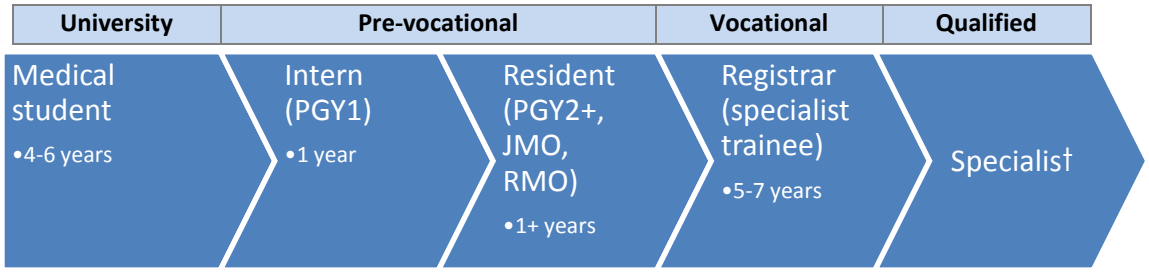
There are four distinct stages in the Australian medical training pathway, as illustrated in Figure 1 below. More detail and discussion on these pathways is provided by Health Workforce Australia

(Health Workforce Australia, 2013). The timing of career choices is different across countries. For example, in the US, medical students need to choose their residency program (specialty training program) before they graduate, though it is not known whether this earlier choice leads to more specialty switching later on.

Available reviews indicate that a minority of students in Australia and the UK have made their career choices by the end of medical school (Bunker et al., 2009; Thistlethwaite et al., 2007). National data in Australia from final-year medical students in 2011 indicated that 25.9% felt 'not at all certain' about their stated preference for specialisation, while 59.2% were 'moderately certain' and 14.9% 'absolutely certain' (Medical Deans Australia and New Zealand, 2012a). Of 264 final-year medical students surveyed in 2008, 19.5% felt 'not at all certain', 63% were 'moderately certain', and 17.6% were certain (Medical Deans Australia and New Zealand, 2010). Those at the end of postgraduate year one (PGY1) were more certain of their specialty choice. Those who were uncertain had fallen from 51% in their final year to 37% one year later in PGY1 (Medical Deans Australia and New Zealand, 2012b). Those who were certain of their preferences in PGY1 were more likely to prefer general practice, surgery and adult/internal medicine. General practice is also a preferred backup option.

Earlier data were reported by Harris et al. (2005) in their survey of 4251 doctors already in specialist training programs, and so these data were retrospective. Thirty-seven per cent had made their decision by the end of PGY1, 43% during PGY2 and 3, and 9% during PGY4 and 5. Eleven per cent did not choose until after year 6. Trainee surgeons tended to choose their specialty earlier than others. There were no differences in timing by gender, and more recent graduates tended to make decisions sooner than earlier cohorts (Harris et al., 2005). Prospective longitudinal information, such as that collected by Medical Schools Outcomes Database, may be more accurate than retrospective data on the timing of choices.

Figure 1: Summary of Australian medical training pathway



The early postgraduate years appear to be a critical time in career decision making for the majority of medical graduates, as this is closer to when most apply for specialty training programs (Thistlethwaite et al., 2007). This has been of particular interest in the UK, where the changed structure of medical training in 2005 (the MMC program) meant that graduates were expected to make a choice of specialty at the end of the new two-year foundation program (PGY1 and 2), which was considerably earlier than had been the case in the past for many graduates.

The Medical Careers Research Group in the UK has published a number of studies examining particular specialty fields, including cardiology (Smith et al., 2013), emergency medicine (Svirko et al., 2013), paediatrics (Turner et al., 2007), radiology (Mair et al., 2012; Turner et al., 2006) and general practice (Lambert et al., 2011). These studies, including some using data from before the new foundation program, consistently show the proportion that are certain of their specialty choice increases from PGY1 to PGY3 and again to year 5 after graduation. Comparing the level of certainty in early postgraduate years with their actual specialty ten years after graduation indicates that those who were certain even at PGY1 are highly likely to be working in that specialty ten years after qualification. Conversely, there is also considerable changing of preferences during the early postgraduate years (Goldacre et al., 2010).

4.4 What sources and modes of delivery of information influence career choices?

Question 4: What sources of information (formal and/or informal) have been shown to have the most influence on doctors' or students' career choices?

Standard models of career decision making involve a staged approach which incorporates self-assessment and seeking information about possible options. In the case of doctors, this information generally relates to the different medical specialties (see examples of websites in Appendix 3). There is little evidence available regarding the link between sources of information used and actual career choices. The extant is mostly comprised of survey-based observational studies which either ask fully trained specialists about decisions retrospectively, or track medical graduates over time. Many studies look at specific specialty fields. There are few studies evaluating interventions to influence career choices. There is one Australian systematic review discussed below (Stagg et al., 2012).

The two key sources of information that are focused on in the literature are clinical exposure experiences ('clerkships' or placements) during medical school and in postgraduate years, and role models who are qualified in particular specialty fields. One large Australian study surveyed those already in specialty training, with 55% (2331 out of 4222) of respondents citing 'influence of consultants/mentors' as a factor influencing specialty choice. This was ranked fourth out of 14 factors (Harris et al., 2005).

Short clinical placements during medical school are becoming increasingly common as a way to try to influence students to choose specialties such as general practice (Norris et al., 2009). Such placements can have some influence, although those at the end of medical school may be more influential than those early on (Stagg et al., 2012). The international literature indicates their potential to influence choice of surgery, internal medicine and general practice (Maiorova et al., 2008; Watmough et al., 2007; Wilkinson et al., 2010).

The review by Stagg concluded that teaching quality is important in this context. Where students perceived their clinical supervisors (preceptors) as providing high quality teaching, the influence of those teachers on choice of specialty was increased. It is also important to note that influences can be positive or negative. Clinical teachers and mentors can influence students towards or away from their own specialty field (Stagg et al., 2012). Small scale Australian studies (Laurence et al., 2007) and international research confirm the importance of direct experience on career choice through working in the clinical environment (Smith et al., 2013; Watmough et al., 2007).

Role models encountered during clinical experiences have been reported to be important (Laurence et al., 2007; Stagg et al., 2012). The influence of role models includes observations of, and explicit discussions with, supervising senior clinicians, as well as others such as registrars and fellow junior doctors (Laurence et al., 2007). Role models and mentors have been consistently identified in overseas research as influencing choice of specialty, for example, in geriatrics (Torrible et al., 2006). The literature does not specify how role models influence specialty choice, though the review by Stagg et al. (2012) highlighted that ratings of the quality of teaching played an important role.

There is also literature on the role of mentoring programs and career choice. Mentoring of students and doctors in training has been reviewed by four papers (Buddeberg-Fischer et al., 2006; Frei et al., 2010; Huskins et al., 2011; Sambunjak et al., 2006). Buddeberg-Fischer et al. (2006) found mainly descriptions of mentoring programs. Goals were to increase competence in specialisation, in research, or to enhance professional networks. However, most programs lacked a formal structure and there were no evaluations of their impact on career choice (Buddeberg-Fischer et al., 2006).

Sambunjak et al. (2006) aimed to assess the prevalence of mentorship and its relationship to career development. Most literature was descriptive surveys, though two studies were identified with stronger study designs. Mentoring was reported to be an important aspect of career support and personal development (Sambunjak et al., 2006). Frei et al. (2010) focused on mentoring programs for medical students and the characteristics of programs that were reported to have been successful. These included empowering and encouraging the mentee, and helping them build professional networks. Again, they identified no controlled evaluations of their impact on career choice.

In terms of other sources of information, a small study of Australian medical students found that viewing a 15-minute promotional video about psychiatry had some effect on understanding of this specialty, with 53% reporting increased understanding, but only 29% reporting increased interest in this specialty after viewing (Robertson et al., 2009).

Harris et al. (2012) found job availability to be an important piece of information that influenced specialty choice in Spain. In the UK under MMC, data on competition ratios, i.e. the number of applicants for each specialty training place, are now published (Tooke J et al., 2008). There is no evidence of the impact of this on career choices.

Question 5: What modes of delivery are the most effective in conveying career information to doctors or students, e.g. web/smart phones, face-to-face, case studies, forums, self-assessment tools, etc?

We were not able to identify any Australian or international studies relating to this question. Though generally a need for career advice has been expressed (see the literature discussed for Question 2), there have no direct comparisons of different modes of delivery of career information. The evaluation of the NHS Medical Careers website (as discussed above) indicates satisfaction with web-based information. It was also noted that web searching and recommendations from careers advisers or in written careers information materials were the main avenues through which users found the site (Mellors-Bourne, 2012). This suggests the importance of a comprehensive strategy with information provision through multiple channels. Furthermore, as noted above, the evaluation recommended development of additional, interactive web-based content.

4.5 What influences specialty choice?

Question 6: Focusing specifically on making decisions about vocational training pathways:

a) What factors influence the decision to enter a particular specialty?

There have been two literature reviews (Bunker et al., 2009; Thistlethwaite et al., 2007) and several Australian-based studies on factors influencing specialty choice since 2005 (Ek et al., 2005; Harris et al., 2005; Robertson et al., 2009; Rogers et al., 2010; Sivey et al., 2012; Thomas, 2008; Wigney et al., 2008). Only one of these studies examined an actual intervention (Robertson et al., 2009) using a before and after study, while the others were descriptive and based on responses to cross-sectional surveys or interviews. Only Harris et al. (2005), Rogers et al. (2010), and Sivey et al. (2012) attempted to rigorously examine the relative importance of the different factors using regression analysis to control for the effect of personal characteristics and other factors.

Harris et al. (2005) used a survey of all 7581 medical graduates already enrolled in a specialty vocational training program and sought to ask about the factors that had influenced their choice of program. A list of 22 factors was included in the survey and respondents were asked to rate the influence of each factor on a five-point Likert scale. Logistic regression analysis was used to examine differences in the importance of factors between those in GP training programs and

a range of other specialties. There were 4259 (54%) responses and there was no examination of response bias. Intrinsic factors were rated as having the greatest influence: 'appraisal of own skills and aptitudes' (79% of respondents), 'the intellectual content of the specialty' (75% of respondents) and 'interest in helping people' (74% of respondents). Seven extrinsic factors followed, the most important of which were the 'atmosphere/work culture typical of the specialty' (72% of respondents), 'work experience since graduation' (64% of respondents) and 'opportunity to work flexible hours' (55% of respondents). Those in GP training placed greater importance on helping people, appraisal of own domestic circumstances, and working flexible hours. Only 16% of junior doctors rate 'financial prospects' of the specialty as important, and this was not statistically significant between those in GP training and other specialty training. The authors also compared the role of different factors across different specialties. Compared to those in other training programs, working culture was more important for those in anaesthesia; surgical trainees placed more importance on the influence of consultants and mentors; work experience since graduation was more important for emergency medicine trainees; hours of work were more important for those training in pathology; opportunities to do procedural work were important for emergency medicine, surgery, anaesthesia, and obstetrics and gynaecology; the type of patients seen was more important for emergency medicine and paediatric trainees; adult medicine trainees found the length of training to be important; and the costs of training were more important for pathology trainees. As would be expected, flexibility of hours was more important for female trainees, those with partners, and those with children in influencing their specialty choice. It is clear that the influence of the factors varied across specialties.

Similar results have been found from more recent surveys of medical students and those in PGY1 using the Medical School Outcomes Database. However, the representativeness of these studies has not been established. These asked 1531 pre-vocational doctors at the end of PGY1 in 2011 about the factors influencing their choice of specialty (Medical Deans Australia and New Zealand, 2012b). Nineteen factors were provided and rated on a Likert scale of 1 to 5. The items rated most frequently as highly influencing their choice of specialty were 'atmosphere/work culture', 'appraisal of own skills', 'intellectual content of the specialty', and 'interest in helping people'. This ranking is very similar to the earlier survey of vocational trainees by Harris et al. (2005), suggesting that the key influences are stable over time. Perceived financial prospects and prestige, risk of litigation and the financial costs of training were all rated among the bottom six factors. However, for those uncertain of their specialty choice, financial factors were rated as the most important. Similar rankings and patterns were found for 2513 final year medical students in 2011 (Medical Deans Australia and New Zealand, 2012a).

Sivey et al. (2012) focused specifically on the expected job characteristics of specialties as part of a discrete choice experiment (DCE) in Wave 1 (2008) of the Medicine in Australia: Balancing Employment and Life (MABEL) longitudinal survey of doctors. The survey was sent to 8820 hospital non-specialists that included doctors in pre-vocational training and career medical officers (salaried non-specialists), with a response rate of 16.5 per cent. There were 536 doctors in pre-vocational training who responded to the DCE. These were similar to the population of the whole group in terms of age and hours worked, but were more likely to be female. The attributes in the DCE were expected annual earnings, change in total hours worked, on-call arrangements, control over hours, opportunities for academic research, continuity of care, and opportunities for procedural work. Respondents were asked to choose among a series of pairs of hypothetical scenarios ('specialty A' or 'specialty B'), with varying levels of the above attributes for each pair. Their choices were used to identify the most important attributes of specialty choice. All attributes were found to be statistically significant. The most important attribute was the level of on-call, with doctors preferring less on-call, followed by more control over hours and more procedural work. They also preferred more control over hours, more academic opportunities and more continuity of care, but these were less important overall.

The specialty preferences of final year medical students were examined by Rogers et al. (2010). They recruited 179 students from eight medical schools. There was no assessment of

representativeness and no response rate could be calculated given the voluntary nature of the survey. They were asked about their preferred medical specialty and asked questions that captured their personal values, professional and lifestyle expectations, and personality. Males with higher professional expectations preferred surgery over primary care. Those who were more agreeable, had higher lifestyle expectations, and who desired to practise outside a capital city were more likely to choose primary care than surgery. Having an urban background and higher professional expectations were associated with a preference for a medical specialty over a primary care one. The aggregation of scales into broad variables (e.g. professional expectations) made it difficult to ascertain clear policy-related variables that could be used to influence specialty choice, though the study did reveal issues about motivations and expectations (Rogers et al., 2010).

The impact of undergraduate experience, though not found to be an important factor by Harris et al. (2005) for those who had already chosen their specialty, was specifically examined by Ek et al. (2005) in a sample of 410 final year medical students from Monash and Melbourne Universities. There were 215 (61.2%) responses and there was no discussion of response bias. The survey focused on their intentions to enter surgery and factors influencing this. For those interested in surgery, the technical aspects, personal interest and money/prestige were cited as the most important factors. For those not interested in surgery, lifestyle and family factors were the most important influence, especially for female respondents, who also cited a lack of female role models in surgery. Part-time training would make surgery a more attractive option for a majority. Negative experiences with surgeons were also cited as a main factor. Many thought surgeons were not approachable.

The reasons why surgery was ruled out by junior doctors were examined by Rogers et al. (2012). They used interviews of 41 junior doctors at the end of their intern year as part of a follow-up to a larger quantitative survey administered the year before. Qualitative methods were used. Lifestyle (long working hours and on-call) and culture (pressure, hierarchy, personalities, and male dominated) were the main reasons for rejecting surgery as a career.

The impact of preceptors (the clinician with whom the medical student is working and who has responsibility for the student's learning and the patients' care and safety) on medical students' career choices was examined in a systematic review (Stagg et al., 2012). Many US studies were found that asked students and trainees to rate the quality of preceptors during training, and examined the relationship between preceptor ratings with eventual specialty choice. There was evidence of positive associations between preceptor programs and specialty choice, with these associations stronger where there was continuity of the preceptor, continuity of patient care, and where preceptor programs were longer. However, most studies did not control for self-selection into the preceptor programs, suggesting that unobserved factors may have driven specialty choice rather than preceptor programs themselves.

There are many more overseas studies, but most are descriptive or qualitative in nature and produce a list of factors that influence attitudes and future intentions similar to what has been found by the Australian studies. These other overseas studies do not add to what has already been found from Australian studies. For this reason, they are not reviewed in detail as their applicability to the Australian context is more limited (Al-Fouzan et al., 2012; Andlauer et al., 2012; Arcidiacono et al., 2005; Avery et al., 2012; Bindal et al., 2011; Bobo et al., 2009; Chang et al., 2010; Chew et al., 2011; Corrigan et al., 2007; Dunkley et al., 2008; Ekenze et al., 2013; Goldacre et al., 2010; Hauer et al., 2008; Johnson et al., 2012; Laponis et al., 2011; Lee et al., 2011; Lefevre et al., 2010; Love et al., 2012; Makama et al., 2010; Newton et al., 2005, 2010; Ravindra et al., 2011; Saigal et al., 2007; Scott et al., 2011; Scott et al., 2007; Silberman et al., 2012; Thapper et al., 2013; Torrible et al., 2006; Wang et al., 2011; West et al., 2009).

Some of the overseas studies are, however, notable for their different focus or methods compared to Australian studies. For example, some focus more on the influence of medical

education debt, but this factor is specific to the US, where medical education is largely privately funded (Phillips et al., 2010 ; Rosenblatt et al., 2005). However, in Australia, Sivey et al. (2012) found that the importance of future earnings in specialty choices was influenced by the level of medical education debt. This wasn't examined by Harris et al. (2005).

Harris et al. (2013) used a similar choice model to Sivey et al. (2012) for graduating medical students in Spain. The main difference is that Harris used data on preference rankings and provided choices among their preferred specialty and other sets of randomly chosen specialties. Respondents were then asked to score each specialty in terms of the importance of seven factors: probability of obtaining employment; lifestyle and hours of work; recognition by patients; prestige among colleagues; opportunity for professional development; annual remuneration; and amount of private practice income. In the context of the global financial crisis, they found that perceived job availability had the biggest impact on specialty preference, which was more important than income. Lifestyle factors also mattered, but this varied among different types of doctor (Harris et al., 2013).

The study by Phillips et al. (2009) used a range of linked US datasets over several decades to examine the impact of student debt at graduation, medical school funding grants related to primary care, specialty income differences, and medical school experiences on eventual choice of primary care specialty and care for underserved populations. The use of this longitudinal data improves the quality of this study compared to cross-sectional surveys. They also compared student intentions with final choices and found a strong correlation. Regression analysis was used to control for other factors influencing specialty choice. They found little impact of student debt on choosing a primary care specialty, but this differed between those from private and public medical schools. Medical school grants to promote primary care were associated with primary care choice and care for underserved populations. Income gaps at graduation also influenced primary care choice, as did attending a public rather than private medical school.

A number of overseas studies have also evaluated interventions aimed at increasing numbers choosing a particular specialty. The types of interventions include increased exposure to the specialty during training through placements and clerkships (Du et al., 2009; Eagles et al., 2007; Fischel et al., 2008; Fournier et al., 2005; Goldin et al., 2012; Maiorova et al., 2008; Malloy et al., 2008; Stagg et al., 2012; Wilkinson et al., 2010); the impact of workshops (Leong et al., 2005; Martin et al., 2007); information such as leaflets and DVDs (Robertson et al., 2009); and mentoring (Indyk et al., 2011; Stagg et al., 2012). Most studies, given the US context, examine interventions aimed at medical students since they need to choose a specialty while a student. All of these interventions have poor study designs, such as before and after studies with no control group (Goldin et al., 2012; Malloy et al., 2008; Martin et al., 2007; Wilkinson et al., 2010). Many focus on attitudes rather than actual career choices as outcomes (Fischel et al., 2008; Leong et al., 2005; Malloy et al., 2008; Martin et al., 2007). Their results should not therefore be relied upon and are not summarised in detail.

b) For those specialties that are perceived to be less popular (see Appendix 1), what factors influence the decision to enter these particular specialties?

From the Australian studies reviewed in the previous section, we go into more detail about their results on less popular specialties as defined in Appendix 1. Other studies are also summarised that specifically focus on these specialties. Harris et al. (2005) compared the factors influencing specialty choice to examine whether certain factors were more important in one specialty compared to all specialties on average. The study uses broader specialty aggregates than those in the appendix, and so does not cover all shortage specialties.

- Adult Medicine – the length of the training program and opportunities for research and teaching had a greater influence compared to other specialties, though it was unclear whether the training program was considered too long or too short

- Pathology – hours of work, opportunities for research and teaching, and the costs of training in the specialty were rated more highly compared to other specialties. The direction of these effects, e.g. whether higher or lower costs mattered, was unclear
- Psychiatry – flexible working hours and experience as a medical student were more important compared to other specialties
- Ophthalmology – opportunities to do procedural work and flexibility of hours were most important
- Radiology was generally no different from the average, so no particular factors stood out for this group
- Obstetrics and Gynaecology – three factors were most important compared to other specialties: opportunities to do procedural work; availability of training placements; and the costs of training in the specialty.

Sivey et al. (2012) was the only other study to compare across specialties in their policy simulation. This showed that increasing the opportunity to do procedural work from none to some would increase the proportion choosing general practice by 13 percentage points, from 40% to 53 per cent. Increasing GP earnings by $50,000 was predicted to increase the percentage of doctors choosing general practice by 10 percentage points. Increasing academic opportunities had the lowest increase of about eight per cent. The importance of future earnings depended on the level of education debt, and preferences were not influenced by gender or the presence of children.

General practice has been the subject of two literature reviews (Bunker et al., 2009; Thistlethwaite et al., 2007). Bunker et al. (2009) undertook a literature review and narrative synthesis about the factors influencing choice of general practice (Bunker et al., 2009). The methodological quality of included studies was not examined. They found that students of rural origin are more likely to work in rural and more generalist practice settings, and that positive student experiences may play a role, including role models. The influence of other factors was less clear. Thistlethwaite et al. (2007) also conducted a literature review on factors influencing the choice of primary care as a career. They reviewed 198 papers, mostly focused on medicine, and also conducted interviews. They found that the length and quality of clinical attachments in general practice and in community settings during training are important, as are remuneration and flexibility of training, alongside family factors for women.

The report by Thistlethwaite et al. (2007) also conducted interviews that appeared in a separate paper (Thistlethwaite et al., 2008). Thirty-eight interviews were conducted with students, junior doctors, GPs and GP registrars. They found a range of factors influencing career choice, with their conclusions highlighting the role of general practice learning experience.

A qualitative study used 10 focus groups across three universities in NSW to examine factors associated with an interest in general practice (Tolhurst et al., 2005). In addition to positive perceptions such as diversity of work, continuity of care, and flexible working conditions, there were also a number of negative perceptions of general practice, such as 'boring work', running a business, and poor working conditions.

Thomas (2008) surveyed 1000 trainees in psychiatry with 267 (27%) responding, which was representative in terms of gender, country of training and level of training. Open-ended questions were asked about the main reasons for choosing psychiatry and analysed using qualitative methods. Personal factors were mentioned more frequently than job-related factors. Work-life balance and patient contact were the most common job-related factors, while interest and enjoyment and helping others were the most frequently cited personal factors (Thomas, 2008).

Psychiatry was also examined by Wigney et al. (2008). They included an open-ended question as part of the Year 5 exam for 33 senior medical students and used qualitative analysis to analyse their open-ended responses. This study identified a wide range of factors, the most frequent of which were personal interest and lifestyle factors. Helping people, financial benefits, and variety of patients and settings were also mentioned.

c) How can less popular specialties be promoted to be more attractive?

The evidence on what can be done to improve the attractiveness of specialties is generally weak. The studies summarised in the previous two sections can, at best, give an idea of which factors require further exploration as potential interventions to influence specialty choice. Though many factors are mentioned as potentially important, only a few are amenable to influence by employers or government. Existing studies also help to define the range of information that could potentially be provided to junior doctors that might influence their decisions. However, there is little guidance as to how this information should be delivered. Harris et al. (2005) provides evidence for specific specialties in Australia (see above), but again these can only be used to suggest further avenues to explore or help define the types of information that can be included.

There was only one Australian study that had examined the impact of an intervention on attitudes rather than specialty choice. Robertson examined the impact of a DVD on medical students' attitudes towards psychiatry using a small before and after study. The response rate was 11 per cent. The study found that negative attitudes towards psychiatry became more positive immediately after viewing the DVD (Robertson et al., 2009).

4.6 What influences decisions to work in rural and remote areas?

Question 7: Focusing specifically on making decisions to work in rural and remote areas:

a) What factors influence doctors to practise in rural and remote locations?

There is a large volume of literature and several existing reviews of the literature on factors influencing the decision to move to (recruitment) and stay in (retention) rural and remote areas. This includes a recent Australian Government Senate Inquiry into the issue (Senate Community Affairs References Committee, 2012). Despite the considerable literature identifying factors that influence the recruitment and retention of doctors in remote and rural areas, to date there exists little rigorous evidence about which policies are the most effective in increasing the supply of doctors to 'underserved' areas (Barnighausen et al., 2009; Buykx et al., 2010; Grobler et al., 2009). These systematic reviews, including one Cochrane review, found very weak evidence of effectiveness, with many poor study designs. The Cochrane review could not find any studies to include that met their minimum quality criteria based on study design (Grobler et al., 2009). The review by Thistlethwaite et al. (2007) also focused on Australian evidence.

By far the most common factor associated with rural practice across many countries and studies is the rural background of the doctor (Jones et al., 2012; McGrail et al., 2011; Rabinowitz et al., 2012; Rabinowitz et al., 2008a). This includes not only exposure to rural practice during medical school and postgraduate training, but also the recruitment to medical school of students from rural areas. For example, the most recent Australian study is McGrail et al. (2011), which uses data from the MABEL survey to examine the association between the number of years growing up in a rural area to whether the doctor currently works in a rural or metro area. They use data from Wave 1 (2008) of the survey and compare the association for doctors who are unrestricted in their practice location, and compare 3156 GPs and 2425 specialists. They find a strong

association for GPs who spent more than five years growing up in a rural area, and for specialists who spent more than 11 years growing up in a rural area.

This type of evidence has directly led to policies, including the introduction of rural clinical schools (Forster et al., 2013; Senate Community Affairs References Committee, 2012), exposure to rural practice during training (Rabinowitz et al., 2011; Thistlethwaite et al., 2007; Zink et al., 2010), and the targeted recruitment of health workers who grew up in rural areas. However, as is clear from the systematic reviews and recent government reviews, these policies have not yet been properly evaluated and it is not clear which aspects of rural background or rural training programs have the most impact (Ranmuthugala et al., 2007). There is uncertainty about the optimal length and other characteristics of rural undergraduate and postgraduate placements (Thistlethwaite et al., 2007). It has also been pointed out that the quality of the evidence on the association of rural training exposure to rural practice is poor because rural background was not controlled for. Those who choose rural placements are more likely to be from rural backgrounds, suggesting that the 'cause' of rural practice was not the rural training but the rural background of the student (Ranmuthugala et al., 2007). There may also be other unobserved characteristics of individuals that influence both choice of placement and choice of rural practice. Rigorous controlled evaluations of compulsory rural training should be conducted to examine this issue.

Other policies have included restrictions on mobility, such as mandatory practice in rural areas for immigrant health workers, or in terms of bonded training schemes or regulations restricting entry in overserviced areas. Financial or non-financial incentives are also used in many countries to encourage health workers to move to underserviced areas and to stay in those areas. Government intervention may also attempt to reduce the transaction costs of moving. These include family factors such as schooling and employment for a partner, and assistance with the costs of establishing a small business. Evidence on the impact of these policies is scant.

In the absence of evaluations of incentive policies, the design of policies has been informed by surveys containing discrete choice experiments of medical students or medical practitioners. Many of these have been conducted in low- and middle-income countries, where rural distribution is also an issue (Hanson et al., 2010; Kruk et al., 2010; Lagarde et al., 2009; Raha et al., 2009). They tend to focus on incentive policies and improving the characteristics of jobs in rural areas. The only such study to have been conducted in Australia surveyed 3727 GPs as part of the MABEL survey (Scott et al., 2013). Attributes included hours worked, on-call, type of rural area, opportunities for social interactions, the size of the practice team, and consultation length. The study found that for the rural job with the least attractive attributes, GPs would need to be compensated $230,000, but this figure fell when other job characteristics were improved. The level of on-call was the most important attribute, followed by opportunities for social interactions and locum cover.

b) When in their career pathway do doctors make decisions to practise in rural and remote locations?

There are few data on when this happens, as it is also likely to be associated with specialty choice. In Australia, the Medical School Outcomes Database provides data on the location preferences of final year medical students and those in PGY1 in 2011. Of the 1531 PGY1 doctors surveyed, 68.6% preferred to be in a capital city, 15.1% in a major urban centre (population>100,000), and the remaining 16.4% in rural and remote areas with smaller population sizes. Only 4% preferred working in small towns with populations less than 10,000 people (Medical Deans Australia and New Zealand, 2012b). Very similar proportions were found from 2556 final year medical students in 2011 (Medical Deans Australia and New Zealand, 2012a). No data are presented on the representativeness of these samples, but 90% of the sample was from universities in capital cities.

5 Conclusions

This rapid review has examined the evidence of the extent to which medical careers can be influenced by employers and government. Overall, there is no empirical evidence that exists, suggesting that career choices can or cannot be influenced this way. This is because the quality of the evidence is very poor, with only a few intervention studies that have been poorly designed. There is no evidence of the impact of career advice or the source of career information.

There is, however, a much larger volume of literature based on cross-sectional surveys and qualitative research that suggest which factors were likely to have influenced career choices. At best, this literature is suggestive of further avenues of exploration in the design of interventions to influence career choices. This literature gives little guidance on which factors are the most important and that can be influenced by policy.

The fact that there is very little Australian literature makes it difficult to say how applicable these studies are to NSW. Some of the Australian studies were conducted using national samples, while others reported results from a variety of specific states.

There is a clear need for higher quality research in this area. This includes research on the impact of changes to medical education and training, research on how to influence the preferences of junior doctors, and research on how changing the job characteristics of specialties can influence career choice. This requires not only investment in longitudinal data collection that map and follow medical careers, but also investment in the research skills of those undertaking such research.

This report has not examined the role of changing the relative supply of vocational training places across specialties in influencing career choices, but this is also an avenue that needs to be explored through the proposed new National Medical Training Advisory Network. As has already happened in the UK, increased competition for vocational/specialty training places placed enormous pressure on the training system and also led to new policies that made traditional salaried career medical officer positions more attractive as a career option. A focus on the needs of this group of doctors should also be considered as their numbers grow.

6 References

Al-Fouzan R, Al-Ajlan S, Marwan Y, Al-Saleh M. Factors affecting future specialty choice among medical students in Kuwait. Med Educ Online 2012;17:1–7.

Andlauer O, Guicherd W, Haffen E, Sechter D, Bonin B et al. Factors influencing French medical students towards a career in psychiatry. Psychiatr Danub 2012;24(Supp 1):S185–S190.

Arcidiacono P, Nicholson S. Peer effects in medical school. J Public Econ 2005;89:327–350.

Avery DM Jr, Wheat JR, Leeper JD, McKnight JT, Ballard BG et al. Admission factors predicting family medicine specialty choice: a literature review and exploratory study among students in the rural medical scholars program. J Rural Health 2012;28(2):128–136.

Bärnighausen T, Bloom DE. Financial incentives for return of service in underserved areas: a systematic review. BMC Health Serv Res 2009;9:86.

Bindal T, Wall D, Goodyear HM. Medical students' views on selecting paediatrics as a career choice. Eur J Pediatr 2011;170(9):1193–1199.

Bobo WV, Nevin R, Greene E, Lacy TJ. The effect of psychiatric third-year rotation setting on academic performance, student attitudes, and specialty choice. Acad Psychiatry 2009;33(2):105–111.

Buddeberg-Fischer B, Herta KD. Formal mentoring programmes for medical students and doctors – a review of the Medline literature. Med Teach 2006;28(3):248–257.

Bunker J, Shadbolt N. Choosing general practice as a career – the influences of education and training. Aust Fam Physician 2009;38(5):341–344.

Buykx P, Humphreys J, Wakerman J, Pashen D. Systematic review of effective retention incentives for health workers in rural and remote areas: towards evidence-based policy. Aust J Rural Health 2010;18(3):102–109.

Chambers R, Mohanna K, Thornett A, Field S. Guiding doctors in managing their careers: a toolkit for tutors, trainers, mentors and appraisers. Oxford, Seattle: Radcliffe Publishing, 2006.

Chang JC, Odrobina MR, McIntyre-Seltman K. Residents as role models: the effect of the obstetrics and gynecology clerkship on medical students' career interest. J Grad Med Educ 2010;2(3):341–345.

Chew YW, Rajakrishnan S, Low CA, Jayapalan PK, Sreeramareddy CT. Medical students' choice of specialty and factors determining their choice: a cross-sectional questionnaire survey in Melaka-Manipal Medical College, Malaysia. BioSci Trends 2011;5(2):69–76.

Collins, J. Foundation for excellence: an evaluation of the foundation programme. London: Medical Education England, 2010.

Corrigan MA, Shields CJ, Redmond HP. Factors influencing surgical career choices and advancement in Ireland and Britain. World J Surg 2007;31(10):1921–1929.

Davison I, Burke S, Bullock A, Brown C, Campbell C et al. Evaluation of a pilot careers advice service for junior doctors. Med Teach 2006;28(6):561–563.

Delamothe T. Modernising Medical Careers: final report. BMJ 2008;336(7635):54–55.

Department of Health. Career Management: an approach for medical schools, deaneries, royalcolleges and trusts. London: Department of Health, 2005.

Dohn H. Choices of careers in medicine: some theoretical and methodological issues. Med Educ 1996;30(3):157–160.

Du J, Sathanathan J, Naden G, Child S. A surgical career for New Zealand junior doctors? Factors influencing this choice. N Z Med J 2009;122(1300):29–37.

Dunkley L, Filer A, Speden D, Bax D, Crisp A. Why do we choose rheumatology? Implications for future recruitment – results of the 2006 UK Trainee Survey. Rheumatolog (Oxford) 2008;47(6):901–906.

Eagles JM, Wilson S, Murdoch JM, Brown T. What impact do undergraduate experiences have upon recruitment into psychiatry? Psychiatric Bulletin 2007;31:70–72.

Ek EW, Ek ET, Mackay SD. Undergraduate experience of surgical teaching and its influence on career choice. ANZ J Surg 2005;75(8):713–718.

Ekenze SO, Ugwumba FO, Obi UM, Ekenze OS. Undergraduate surgery clerkship and the choice of surgery as a career: perspective from a developing country. World J Surg 2013;37(9):2094–2100.

Elton C. Giving careers advice part two: a structured approach to career planning. Hospital Doctor 2006;Apr 6:42.

Elton C, Newport M. The reflective elective: using the elective to develop medical students' skills in career planning. Br J Hosp Med (Lond) 2008;69(7):409–411.

Fischel T, Manna H, Krivoy, A, Lewis M, Weizman A. Does a clerkship in psychiatry contribute to changing medical students' attitudes towards psychiatry? Acad Psychiatry 2008;32(2):147–150.

Forster L, Assareh H, Watts LD, McLachlan CS. Additional years of Australian Rural Clinical School undergraduate training is associated with rural practice. BMC Med Educ 2013;13:7.

Fournier GM, Henderson C. Incentives and physician specialty choice: a case study of Florida's Program in Medical Sciences. Inquiry 2005;42(2):160–170.

Frei E, Stamm M, Buddeberg-Fischer B. Mentoring programs for medical students – a review of the PubMed literature 2000–2008. BMC Med Edu 2010;10:32.

Goldacre MJ, Laxton L, Lambert TW. Medical graduates' early career choices of specialty and their eventual specialty destinations: UK prospective cohort studies. BMJ 2010; 341:c3199.

Goldin SB, Schnaus MJ, Horn G, Mateka J, DiGennaro J et al. Surgical interest and surgical match for third-year students: results of a prospective multivariate longitudinal cohort study. J Am Coll Surg 2012; 215(5):599–606.

Goodyear H, Kennedy C, Wall D. Career choices: foundation year trainees' views on careers advice and information. Br J Hosp Med (Lond) 2007;68(4):211–215.

Grobler L, Marais BJ, Mabunda SA, Marindi PN, Reuter H et al. Interventions for increasing the proportion of health professionals practising in rural and other underserved areas. Cochrane Database Syst Rev, 2009 Jan 21;(1):CD005314.

Hanson K, Jack W. Designing incentives for rural health workers. In Jack W, De Laat J, Hanson K, Soucat A, editors. Incentives and Dynamics in the Ethiopian Health Worker Labor Market. World Bank Working Paper No. 192. Washington, DC: The World Bank 2010;ch3:55.

Harris JE, Gonzalez López-Valcárcel B, Ortún V, Barber P. Specialty choice in times of economic crisis: a cross-sectional survey of Spanish medical students. BMJ Open 2013;3(2).

Harris JA, McKay DW. Evaluation of medical career-counseling resources across Canada. Teach Learn Med 2012;24(1):29–35.

Harris MG, Gavel PH, Young JR. Factors influencing the choice of specialty of Australian medical graduates. Med J Aust 2005;183(6):295–300.

Hauer KE, Durning SJ, Kernan WN, Fagan MJ, Mintz M et al. Factors associated with medical students' career choices regarding internal medicine. JAMA 2008;300(10):1154–1164.

Health Workforce Australia. National Medical Training Advisory Network. Discussion Paper. Adelaide: Health Workforce Australia, 2013.

Huskins WC, Silet K, Weber-Main AM, Begg MD, Fowler VG Jr et al. Identifying and aligning expectations in a mentoring relationship. Clin Transl Sci 2011;4(6):439–447.

Indyk D, Deen D, Fornari A, Santos M, Lu WH et al. The influence of longitudinal mentoring on medical student selection of primary care residencies. BMC Med Educ 2011;11:27.

Johnson AL, Sharma J, Chinchilli VM, Emery SE, McCollister Evarts C et al. Why do medical students choose orthopaedics as a career? J Bone Joint Surg Am 2012;94(11):e78.

Jones M, Humphreys JS, McGrail MR. Why does a rural background make medical students more likely to intend to work in rural areas and how consistent is the effect? A study of the rural background effect. Aust J Rural Health 2012;20(1):29–34.

Kashiwagi DT, Varkey P, Cook DA. Mentoring programs for physicians in academic medicine: a systematic review. Acad Med 2013;88(7):1029–1037.

Kruk ME, Johnson JC, Gyakobo M, Agyei-Baffour P, Asabir K et al. Rural practice preferences among medical students in Ghana: a discrete choice experiment. Bull World Health Organ 2010;88(5):333–341.

Lagarde M, Blaauw D. A review of the application and contribution of discrete choice experiments to inform human resources policy interventions. Hum Resour Health 2009;7:62.

Lambert TW, Goldacre MJ. Views of doctors in training on the importance and availability of career advice in UK medicine. Med Educ 2007;41(5):460–466.

Lambert T, Goldacre M. Trends in doctors' early career choices for general practice in the UK: longitudinal questionnaire surveys. Br J Gen Pract 2011;61(588):e397–e403.

Lambert TW, Surman G, Goldacre MJ. Views of UK-trained medical graduates of 1999–2009 about their first postgraduate year of training: national surveys. BMJ Open 2013;3(4).

Laponis R, O'Sullivan PS, Hollander H, Cornett P, Julian K. Educating generalists: factors of resident continuity clinic associated with perceived impact on choosing a generalist career. J Grad Med Educ 2011;3(4):469–474.

Laurence C, Elliott T. When, what and how South Australian pre-registration junior medical officers' career choices are made. Med Educ 2007;41(5):467–475.

Lee J, Alfieri M, Patel T, Lee L. Choosing family medicine residency programs: what factors influence residents' decisions? Can Fam Physician 2011;57(3):e113–e121.

Lefevre JH, Roupret M, Kerneis S, Karila L. Career choices of medical students: a national survey of 1780 students. Med Educ 2010;44(6):603–612.

Leong F, Hardin E, Gaylor M. Career specialty choice: a combined research-intervention project. J Vocat Beav 2005;67:69–86.

Love JN, Howell JM, Hegarty CB, McLaughlin SA, Coates WC et al. Factors that influence medical student selection of an emergency medicine residency program: implications for training programs. Acad Emerg Med 2012;19(4):455–460.

Lyons Z. Attitudes of medical students toward psychiatry and psychiatry as a career: a systematic review. Acad Psychiatry. 2013;37(3):150–157.

Maiorova T, Stevens F, Scherpbier A, van der Zee J. The impact of clerkships on students' specialty preferences: what do undergraduates learn for their profession? Med Educ 2008;42(6):554–562.

Mair G, Ewing F, Murchison JT. Survey of UK radiology trainees in the aftermath of 'Modernising Medical Careers'. BMC Med Educ 2012;12:93.

Makama JG, Ameh EA. Does general surgery clerkship make a future career in surgery more appealing to medical students? Afr Health Sci 2010;10(3):292–296.

Malloy E, Hollar D, Lindsey BA. Increasing interest in child and adolescent psychiatry in the third-year clerkship: results from a post-clerkship survey. Acad Psychiatry 2008;32(5):350–356.

Marshall M. The future for trainee doctors. BMJ 2007;335(7632):1222–1223.

Martin VL, Bennett DS, Pitale M. Medical students' interest in child psychiatry: a clerkship intervention. Acad Psychiatry 2007;31(3):225–227.

McGrail MR, Humphreys JS, Joyce CM. Nature of association between rural background and practice location: a comparison of general practitioners and specialists. BMC Health Serv Res 2011;11:63.

Medical Deans Australia and New Zealand. Medical Schools Outcomes Database. 2008 Medical Students Exit Questionnaire. National Data Report. Sydney: Medical Deans of Australia and New Zealand, 2010.

Medical Deans Australia and New Zealand. Medical Schools Outcomes Database. 2011 EQ [Exit Questionnaire] National Data Report. Sydney: Medical Deans Australia and New Zealand, 2012.

Medical Deans of Australia and New Zealand. Medical Schools Outcomes Database. 2011 PGY1 National Data Report. Sydney: Medical Deans Australia and New Zealand, 2012.

Mehmood SI, Norcini JJ, Borleffs JC. Newly qualified doctors' views on the significance and accessibility of career advice during medical training in Saudi Arabia. Med Teach 2013;35 Suppl 1:S20–S24.

Mellors-Bourne R. 2012 Evaluation of the NHS Medical Careers website. Cambridge, UK: Careers Research and Advisory Centre, 2012.

Newton DA, Grayson MS, Thompson LF. The variable influence of lifestyle and income on medical students' career specialty choices: data from two U.S. medical schools, 1998–2004. Acad Med 2005;80(9):809–814.

Newton DA, Grayson MS, Thompson LF. Money, lifestyle, or values? Why medical students choose subspecialty versus general pediatric careers. Clin Pediatr (Phila) 2010;49(2):116–122.

Norris TE, Schaad DC, DeWitt D, Ogur B, Hunt DD et al. Longitudinal integrated clerkships for medical students: an innovation adopted by medical schools in Australia, Canada, South Africa, and the United States. Acad Med 2009;84(7):902–907.

Phillips JP, Weismante DP, Gold KJ, Schwenk TL. Medical student debt and primary care specialty intentions. Fam Med 2010;42(9):616–622.

Phillips RL, Dodoo MS, Petterson S, Xierali I, Bazemore A et al. Specialty and geographic distribution of the physician workforce: what influences medical student and resident choices? Washington, DC: The Robert Graham Center: Policy Studies in Family Medicine and Primary Care, 2009.

Prendergast C. The provision of incentives in firms. J Econ Lit 1999;37(1):7–63.

Rabinowitz HK, Diamond JJ, Markham FW, Santana AJ. Increasing the supply of rural family physicians: recent outcomes from Jefferson Medical College's Physician Shortage Area Program (PSAP). Acad Med 2011;86(2):264–269.

Rabinowitz HK, Diamond JJ, Markham FW, Santana AJ. The relationship between entering medical students' backgrounds and career plans and their rural practice outcomes three decades later. Acad Med 2012;87(4):493–497.

Rabinowitz HK, Diamond JJ, Markham FW, Wortman JR. Medical school programs to increase the rural physician supply: a systematic review and projected impact of widespread replication. Acad Med 2008;83(3):235–243.

Rabinowitz HK, Diamond JJ, Markham FW, Wortman JR. Medical school programs to increase the rural physician supply: a systematic review and projected impact of widespread replication. Acad Med 2008;83(3):235–243.

Raha S, Berman P, Bhatnagar A. Career Preferences of Medical and Nursing Students in Uttar Pradesh. Washington, DC: World Bank, 2009.

Ranmuthugala G, Humphreys J, Solarsh B, Walters L, Worley P et al. Where is the evidence that rural exposure increases uptake of rural medical practice? Aust J Rural Health 2007;15(5):285–288.

Ravindra P, Fitzgerald JE. Defining surgical role models and their influence on career choice. World J Surg 2011;35(4):704–709.

Robertson T, Walter G, Soh N, Hunt G, Cleary M et al. Medical students' attitudes towards a career in psychiatry before and after viewing a promotional DVD. Australas Psychiatry 2009;17(4);311–317.

Rogers ME, Searle J, Creed PA, Ng S.-K. A multivariate analysis of personality, values and expectations as correlates of career aspirations of final year medical students. Int J Educ Vocat Guidance 2010;10(3):177–189.

Rosenblatt RA, Andrilla CH. The impact of U.S. medical students' debt on their choice of primary care careers: an analysis of data from the 2002 medical school graduation questionnaire. Acad Med 2005;80(9);815–819.

Saigal P, Takemura Y, Nishiue T, Fetters MD. Factors considered by medical students when formulating their specialty preferences in Japan: findings from a qualitative study. BMC Med Educ 2007;7:31.

Sambunjak D, Straus SE, Marusic A. Mentoring in academic medicine: a systematic review. JAMA 2006;296(9):1103–1115.

Scott A, Witt J, Humphreys J, Joyce C, Kalb G et al. Getting doctors into the bush: general practitioners' preferences for rural location. Soc Sci Med 2013;96:33–44.

Scott I, Gowans M, Wright B, Brenneis F, Banner S et al. Determinants of choosing a career in family medicine. CMAJ 2011;183(11):E1–E8.

Scott I, Wright B, Brenneis F, Brett-Maclean P, McCaffrey L. Why would I choose a career in family medicine?: Reflections of medical students at 3 universities. Can Fam Physician 2007;53(11):1956–1957.

Senate Community Affairs References Committee. The factors affecting the supply of health services and medical professionals in rural areas. Canberra, ACT: Parliament House, 2012.

Silberman EK, Belitsky R, Bernstein CA, Cabaniss DL, Crisp-Han H et al. Recruiting researchers in psychiatry: the influence of residency vs. early motivation. Acad Psychiatry 2012;36(2):85-90.

Sivey P, Scott A, Witt J, Joyce, C, Humphreys J. Junior doctors' preferences for specialty choice. J Health Econ 2012;31(6):813–823.

Smith F, Lambert TW, Pitcher A, Goldacre MJ. Career choices for cardiology: cohort studies of UK medical graduates. BMC Med Educ 2013;13:10.

Stagg P, Prideaux D, Greenhill J, Sweet L. Are medical students influenced by preceptors in making career choices, and if so how? A systematic review. Rural Remote Health 2012;12:1832.

Straus SE, Straus C, Tzanetos K. International Campaign to Revitalise Academic Medicine. Career choice in academic medicine: systematic review. J Gen Intern Med 2006;21(12):1222–1229.

Surman,G, Lambert TW, Goldacre MJ. Trends in junior doctors' certainty about their career choice of eventual clinical specialty: UK surveys. Postgrad Med J 2013;89(1057):632–637.

Svirko E, Lambert T, Brand L, Goldacre MJ. Career choices for emergency medicine: national surveys of graduates of 1993–2009 from all UK medical schools. Emerg Med J. 2013 Apr 10. [Epub ahead of print]

Thapper M, Roussou E. Medical students' attitude towards rheumatology training at foundation years' level in the UK and rationale behind the students' choice: results from a national survey. Rheumatol Int 2013;33(4);933–938.

Thistlethwaite J, Kidd MR, Leeder S, Shaw T, Corcoran K. Enhancing the choice of general practice as a career. Aust Fam Physician 2008;37(11):964–968.

Thistlethwaite J, Shaw T, Kidd M, Leeder S. Burke C, Corcoran K. Attracting health professionals into primary care: Strategies for recruitment. Canberra, ACT: Australian Primary Health Care Research Institute (APHCRI), The Australian National University, 2007.

Thomas T. Factors affecting career choice in psychiatry: a survey of RANZCP trainees. Australasian Psychiatry 2008;16(3):179–182.

Tolhurst H, Stewart M. Becoming a GP – a qualitative study of the career interests of medical students. Aust Fam Physician 2005;34(3):204–206.

Tooke J, Ashtiany S, Carter D, Cole A, Michael J et al. Aspiring to excellence. Findings and recommendations of the independent inquiry into Modernising Medical Careers. London: MMC Inquiry, 2008.

Torrible SJ, Diachun LL, Rolfson DB, Dumbrell AC, Hogan DB. Improving recruitment into geriatric medicine in Canada: findings and recommendations from the geriatric recruitment issues study. J Am Geriatr Soc 2006;54(9):1453–1462.

Turner G, Lambert TW, Goldacre MJ, Turner S. Career choices for paediatrics: national surveys of graduates of 1974–2002 from UK medical schools. Child Care Health Dev 2007;33(3):340–346.

Turner G, Lambert TW, Goldacre MJ. Career choices for radiology: national surveys of graduates of 1974–2002 from UK medical schools. Clin Radiol 2006;61(12):1047-1054.

Wang T, Wong B, Huang A, Khatri P, Ng C et al. Factors affecting residency rank-listing: a Maxdiff survey of graduating Canadian medical students. BMC Med Educ 2011;11:61.

Watmough S, Taylor D, Ryland I. Using questionnaires to determine whether medical graduates' career choice is determined by undergraduate or postgraduate experiences. Med Teach 2007;29(8):830–832.

West CP, Drefahl MM, Popkave C, Kolar JC. Internal medicine resident self-report of factors associated with career decisions. J Gen Intern Med 2009;24(8):946–949.

Wigney T, Parker G. Factors encouraging medical students to a career in psychiatry: qualitative analysis. Aust N Z J Psychiatry 2008;42(6):520–525.

Wilkinson JE, Hoffman M, Pierce E, Wiecha J. FaMeS: an innovative pipeline program to foster student interest in family medicine. Fam Med 2010;42(1):28–34.

Zink T, Center B, Finstad D, Boulger JG, Repesh LA et al. Efforts to graduate more primary care physicians and physicians who will practice in rural areas: examining outcomes from the university of Minnesota–duluth and the rural physician associate program. Acad Med 2010;85(4):599–604.

7 Appendices

Appendix 1: Medical specialties predicted to be in shortage

Appendix 2: Tables of included Australian empirical studies

Appendix 3: Medical career planning websites

Appendix 1: Medical specialties predicted to be in shortage

Medical Specialty Workforce Projected Growth to 2025

Priority for Further Growth	Moderate Further Growth	Supply in Balance
General Medicine	General Surgery	Diagnostic Radiology
Palliative Care	Emergency Medicine	Respiratory Medicine
Medical Oncology	Obstetrics & Gynaecology	Anaesthetic and Pain Medicine
Rehabilitation Medicine	Pathology	Intensive Care Medicine
Endocrinology	Psychiatry	Cardiothoracic Surgery
Clinical Haematology	Geriatric Medicine	Neurosurgery
Nuclear Medicine	Paediatric Medicine	Orthopaedic Surgery
Radiation Oncology	Neurology	Vascular Surgery
Paediatric Surgery	Rheumatology	Dermatology
	Renal Medicine	
	Gastroenterology	
	Cardiology	
	Urology	
	Otolaryngology Surgery	
	Plastic & Reconstructive Surgery	
	Ophthalmology	

Source: NSW Ministry of Health, 2012, Health Professional Workforce Plan
www0.health.nsw.gov.au/pubs/2012/pdf/hprofworkforceplan201222.pdf

Health Workforce 2025 identified the following specialties currently in shortage:
General practice
General medicine
Medical oncology
Psychiatry
Radiation oncology

And those predicted to be in shortage in 2025:
Obstetrics and gynaecology
Ophthalmology
Anatomical pathology
Psychiatry
Diagnostic radiology
Radiation oncology

Appendix 2: Tables of included Australian empirical studies

Study	Study design and purpose	Methods (sample size, setting, specialty)	Findings	Conclusion
Ek et al. 2005	**Study design**: Cross-section survey **Purpose**: To determine the role of undergraduate experience of surgical teaching on career choice	**Sample size:** 251 (61% response rate) **Setting:** All final year medical students at Monash and Melbourne Universities in 2003 **Specialty**: Surgery	32% of respondents indicated an interest in postgraduate surgical training; 43% are uninterested; 24% uncertain. Males more likely to be interested Among those interested, the hands-on/technical aspects of surgery and personal interest were highlighted as the most important reasons. Among those not interested, lifestyle factors, the lack of interest, and previous negative experiences with surgeons were highlighted as important reasons Only 35% of respondents could identify a mentor figure, and 67% believed that undergraduate surgical teaching is adequate. Lifestyle, family and lack of female role models were cited as common reasons by female respondents feeling discouraged from a surgery career	Surgeons and surgical registrars play an important role in surgical career choice. There is a clear need for positive role models, especially for female students
Harris et al. 2005 (and AMWAC, 2005 for full report)	**Study design**: Cross-section survey **Purpose**: To identify the relative importance of extrinsic determinants of doctors' choice of specialty	**Sample size:** 4259 doctors (54% response rate). Representative of target population **Setting:** Doctors in vocational training programs	80% of trainees made their choice of specialty by the end of PGY3 (37% by PGY1, 43% during PGY2 or 3). Differences in timing of decisions across specialties were observed Intrinsic factors that score highly (top 3) in terms of its influence on specialty choice are the 'appraisal of own skills and aptitudes', 'intellectual content of specialty', and 'interest in helping people'. Extrinsic factors are 'work culture of specialty', 'work experience since graduation' and 'opportunity to work flexible hours'. The relative importance of different intrinsic and extrinsic factors varies by clinical specialty	Interventions to influence specialty choice need to occur during the early postgraduate years

Study	Study design and purpose	Methods (sample size, setting, specialty)	Findings	Conclusion
Laurence and Elliott 2007	**Study design:** • Semi-structured interviews • Qualitative, content analysis **Purpose:** To understand how pre-registration junior medical officers make career choices – when decisions are made, what factors impact on choices and their experience in this process	**Sample size:** *n*=54 **Setting:** Pre-registration junior medical officers (PJMO) in South Australian teaching hospitals **Specialty:** All	1. 26% (14 out of 54) had made career decisions in their pre-registration year and 50% (27 out of 54) had still to decide on a career choice 2. Five groups of factors impacted on career choice: • job satisfaction • lifestyle • career path • training program • wider environment The experiences they had of different specialty areas were the most important elements to confirm or disconfirm their potential career choices	The critical role of the PJMO experience as the final determinant in career decision making is an important finding that has been underexplored and warrants further research. The study also suggests that these issues should be examined in the context of specific medical specialties
Robertson et al. 2009	**Study design:** Before and after study **Purpose:** 1. To determine attitudes towards psychiatry as a career 2. To establish the immediate impact on those attitudes of a promotional DVD, released by the Royal Australian and New Zealand College of Psychiatrists	**Sample size:** *n*=123 **Setting:** Medical students across four year levels in the University of Sydney Graduate Medical Program **Specialty:** Psychiatry	**Before viewing the DVD** 1. Only one out of 123 students identified psychiatry as their chosen career 2. It rated well in: • being intellectually challenging • a rapidly advancing field of medicine • providing research opportunities • a good lifestyle **After viewing the DVD** 1. Improved student ratings of: • the specialty being enjoyable • offering effective treatment • having a scientific foundation 2. Enhanced understanding of the role of a psychiatrist in just over half of students 3. Increased interest in psychiatry in about 30% of students	The viewing by medical students of a promotional DVD was found to be effective in improving their attitudes towards psychiatry and increasing their interest in pursuing a career in the specialty. However, the long-term impact of this modest improvement is unknown and the low survey response rate limits the extent to which the results can be generalised

Study	Study design and purpose	Methods (sample size, setting, specialty)	Findings	Conclusion
Rogers et al. 2009	**Study design:** Cross-sectional survey **Purpose:** Development and validation of a scale understanding the role of expectations and values in career choice	**Sample size:** Pilot study: *n*=293 Main study: *n*=499 **Setting:** Medical students, south-east Queensland, Australia **Specialty:** Medical students	Study 1 (four stages): 1. Identification of attitudes and beliefs 2. Generation of scale items 3. Evaluation of scale items by experts 4. A pilot study The pilot study tested the item pool with 293 medical students and allowed item and exploratory factor analyses Study 2: Administered the scales to a second sample of 499 medical students. Confirmatory factor analysis assessed consistency and validity, and identified six psychometrically sound instruments. Initial validity for the scales was found encouraging	The scale allows investigation of students' attitudes and beliefs about choosing a medical specialty and a practice location
Rogers et al. 2010	**Study design:** Cross-sectional survey **Purpose:** To examine the impact of personality, professional and lifestyle expectations, and personal values on intentions for specialty choice, hours worked, and location	**Sample size:** 179 final year medical students **Setting:** From eight Australian medical schools **Specialty:** Medical students	Males with higher professional expectations preferred surgery over primary care Students who were more agreeable, had higher lifestyle expectations, and a desire to practise away from a capital city were likely to choose primary care compared to surgery. Students with higher lifestyle expectations and a desire to practise away from a capital city were likely to choose primary care over medical specialties. Rural practice was associated with lifestyle and professional expectations	Professional and lifestyle expectations play an important role in specialty and location choice. Aspects of personality played a smaller role, and personality played no independent role

Study	Study design and purpose	Methods (sample size, setting, specialty)	Findings	Conclusion
Rogers 2012	**Study design:** Qualitative semi-structured interviews **Purpose:** To identify the reasons why interns would not choose a surgical career	**Sample size:** *n*=41 **Setting:** Junior doctors (interns) from eight medical schools **Specialty:** Surgery	30 out of 41 interns nominated surgery as a specialty they would not choose **Reasons:** 1. Lifestyle associated with surgery (66.7%) 2. Culture within the surgical work environment (53.3%) 3. Lack of interest in performing surgical work (36.7%) 4. Training requirements associated with surgery (33.3%) Women: male domination of surgery; the difficulty and inflexibility of the training program	Efforts are needed to promote interest in surgery as a career, especially for women, to improve the surgical work environment so medical students and junior doctors have exposure to positive role models and surgical placements, and to provide a more flexible approach to surgical training
Sivey et al. 2012	**Study design:** Cross-sectional survey and discrete choice experiment **Purpose:** To identify the effects of expected future earnings and other attributes on specialty choice	**Sample size:** *n*=536 **Setting:** Interns, HMOs/RMOs **Specialty:** All	1. The implied marginal wage estimated is close to the actual wages of senior specialists, but much higher than those of senior GPs 2. In a policy simulation, increasing GPs' earnings by $50,000, or increasing opportunities for procedural or academic work, can increase the number of junior doctors choosing general practice by between 8 and 13 percentage points 3. The simulation implies an earnings elasticity of specialty choice of 0.95	Junior doctors are expecting higher incomes than are available in general practice. Addressing the GP/specialist earnings differential could be an effective policy solution. Increasing procedural work or academic opportunities for GPs could have a similar effect as increasing earnings by $50,000, and increase the number of doctors choosing to train as GPs by between 186 and 308 per year

Study	Study design and purpose	Methods (sample size, setting, specialty)	Findings	Conclusion
Thistlethwaite et al. 2008	**Study design:** Qualitative interviews **Purpose:** To explore the factors that influence students' and junior doctors' career choice, particularly in respect to choosing general practice	**Sample size:** *n*=38 **Setting:** Medical students, junior doctors, general practice registrars, GPs **Specialty:** General practice	1. General practice exposure at medical school and for junior doctors 2. The attractions of general practice as a career and making general practice more attractive as a career option 3. General practice teaching 4. Teamwork and effects on choice 5. Effects of rural attachments	There are a number of factors that contribute to medical students' and junior doctors' career choice. Attention needs to be paid to the quality of the general practice learning experience and general practice posts in the early postgraduate years, and the attractions of general practice should be promoted
Thomas 2008	**Study design:** Cross-sectional survey **Purpose:** To identify factors that impact on career choice in order to promote careers in psychiatry to medical graduates	**Sample size:** *n*=267. Response rate of 27% (2567 out of 1000) **Setting:** Psychiatry trainees in Australia and New Zealand **Specialty:** Psychiatry	1. 84% were currently training in Australia and 16% were training in New Zealand 2. More than two-thirds of trainees highlighted a general interest in the area or enjoyment of their experience of psychiatry 3. Frequently mentioned: • work-life balance (29%) • patient contact (20%) • challenge and complexity (17%) • helping people (16%) • holistic perspective (15%) 4. More than 80% of trainees reported being satisfied with their choice of medical specialisation and were positive about the career opportunities that psychiatry offers	Study highlighted a number of factors that impact on career choice and satisfaction with career choice. Promotional materials should utilise these factors in order to more effectively promote careers in psychiatry

Study	Study design and purpose	Methods (sample size, setting, specialty)	Findings	Conclusion
Tolhurst et al. 2005	**Study design:** Qualitative **Purpose:** To identify factors influencing medical students towards general practice as a career choice	**Sample size:** *n*=82 (10 focus groups) **Setting:** Medical students **Specialty:** General practice	50% of students were interested in general practice Positive factors: • Nature of the work (including its diversity) • Continuity of care • Community context • Working conditions (including flexibility of training and work, availability of part-time work and portability of qualifications) Negative factors: • Breadth of knowledge needed • Boring work (in urban general practice) • Having to run a business • Working conditions (including relatively poor remuneration, overwork in rural general practice, and poor status of general practitioners)	Undergraduate experience is an important influence on medical students' career choices. Among the negative experiences, students heard pessimism from their GP preceptors
Wigney et al. 2008	**Study type:** Qualitative (open-ended written) **Purpose:** To survey the attitudes of senior medical students to explore reasons why psychiatry might be regarded as an attractive option as a career	**Sample size:** *n*=33 **Setting:** Senior medical students **Specialty:** Psychiatry	Factors: • Financial • Lifestyle • Stimulating research opportunities Other themes: • Rewarding patient interaction • Holistic care • Variety	Concern that the Australian psychiatric profession is failing to attract sufficient numbers of high quality recruits is growing. While the majority of essays analysed in this account suggested that the students perceived psychiatry as an adequate career that affords the benefits of a balanced lifestyle, the constraining nature of the survey question compelled examinees to provide positive responses. Despite this bias, the responses are nonetheless revealing and contribute to understanding of the factors that may influence trainees to enter the field. On the whole, it would appear that the discipline is currently not exciting keen passions in medical students

Appendix 3: Medical career planning websites

Country and source	Information available	Targeted population
AUSTRALIA **Australia Medical Association** https://ama.com.au/career-planning-doctors-training	Resources for doctors in training such as career planning, advocacy tools, medical news, etc A guide for prospective medical students on the steps to becoming a doctor and the bonded medical places that are offered by the Australian Government	• Doctors in training • Prospective medical students
NEW ZEALAND **Health Workforce New Zealand** www.healthworkforce.govt.nz/health-careers/career-planning/four-step-career-planning-process	Career planning process – four steps to developing your own career plan: • Knowing yourself • Exploring possibilities • Making choices • Making it happen	• School leavers • Medical students • Those interested in a career in Māori health • Those looking for a career change
Health Workforce New Zealand www.healthworkforce.govt.nz/tools-and-resources	1. Type of work including: • Annual plan • Investment and purchasing • Workforce innovations • Workforce service forecasts • GP training review • Advanced Trainee Fellowship Scheme • Regional training hubs • Health science and technical workforce • NZREX preparation placement program • Rural immersion health training placements 2. Health careers including career planning. Includes more than 80 different health careers 3. Development of new workforce roles, new and extended scopes of practice and new models of care 4. Tools and resources, including useful websites and information	• School leavers • Medical students • Those interested in a career in Māori health • Those looking for a career change • Employers and educators

Country and source	Information available	Targeted population
CANADA **University of Manitoba** http://umanitoba.ca/faculties/medicine/student_affairs/careerplanningsteps.html	Career planning steps Over the next four years in medical school, students should: 1. Engage in self-reflection 2. Research different career choice 3. Choose a career path 4. Apply to residency programs	• Medical students
UK **NHS Medical Careers** www.medicalcareers.nhs.uk/career_planning.aspx	Career planning framework – four stages 1. Self-assessment 2. Career exploration 3. Decision making 4. Plan implementation	• Those who are considering medicine as a career • Medical students • Postgraduate doctors • Trainers • Career specialists
US **AAFP (American Academy of Family Physicians)** www.aafp.org/careers.html?navid=careers	Career planning for family physicians including writing a CV, negotiating contracts, compensation models, salaries, statistics and trends, career planning tools, career fair for residents, career fair at assembly, assembly recruitment guide, national conference recruitment guide	• Family physician