

CURRICULUM DEVELOPMENT

The Impact of Medical Students on Rural General Practitioner Preceptors

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ABSTRACT Introduction: *As universities rely more heavily on rural GPs to precept medical students, the formation of symbiotic partnerships benefiting students, universities and GPs, becomes imperative. In order to develop and consolidate these partnerships universities must understand who their rural GP preceptors are and how precepting impacts on them.*

Methods: *A review of the literature was undertaken to determine the significant themes of student impacts from articles where conclusions were clearly based on empirical findings.*

Results: *Forty-three articles were included in the final review, but only nine specifically looked at impacts on rural GPs. Impacts were categorized into six domains: personal; time; patient care; professional relationships and professional development; business and infrastructure; and recognition and remuneration.*

Conclusions: *Literature specifically addressing the impact of precepting on rural GPs is scarce. Further studies are required to evaluate the relationship between the quality of teaching delivered to students, the type and length of student attachments and the likely impacts on rural GPs.*

KEYWORDS *General practitioner, impact, medical student, precepting, rural, teaching.*

Introduction

As universities become more dependent on rural GPs for the delivery of significant amounts of their medical student clinical supervision, they must engage these doctors in mutually rewarding, sustainable partnerships. These partnerships need to be based on an explicit understanding of the rural GPs' motivation for precepting and perceptions of rewards, and the impacts that

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occur as a result of medical student attachments. In Australia there is increasing involvement of rural GPs in teaching and precepting as a result of the government's targeted programs. It is even more important to engage these practitioners in meaningful partnerships as their involvement has evolved more recently than that of their city-based colleagues. For the purposes of this article, a preceptor is defined as a GP responsible for precepting; that is the instruction, mentorship, supervision and assessment of a medical student's clinical performance within the clinical setting.

This study examines the literature of student impacts on GPs through initially summarizing the effects of student teaching on all GPs then, and more specifically, examining the effects of teaching on rural GPs and their practices.

Methods

The Medline, Ovid and ERIC e-databases were searched for original empirical and descriptive articles. Search terms included:

- (1) Medical student or undergraduate or graduate entry or medical teaching,
and
- (2) Doctor or practitioner or clinician or physician or preceptor or mentor,
and
- (3) General practice or family medicine or primary care or ambulatory setting
or community setting.

Because the nature of general practice has changed over time, only articles from 1984 to May 2004 were considered. Any articles involving the impact of medical students on doctors, which did not involve supervision in a clinical setting, were excluded. Articles voicing individual opinions of impacts on GPs, even if considered "expert", were excluded. This resulted in the exclusion of program descriptions where authors' references to impacts on GPs were not clearly based on empirical findings using quantitative or qualitative research methods.

The search was further broadened to include all articles fitting the above criteria found either through related articles in PubMed or in the reference list of the remaining articles or in accessible non-MEDLINE listed Australian rural health publications.

Results

In total 43 articles studying preceptors in Australia, UK and USA were included in the final review, nine of which studied solely rural GPs (Appendix I), nine

studied a mix of both urban and rural preceptors (Appendix II), and the remaining 25 were solely urban (Appendix III available online only). Of the articles found, four were literature reviews and 39 were original research articles or reports. Fourteen of these articles related to GP preceptors generally and 29 related to preceptors involved in specified types of student attachments or specific medical school programs. Only 16 articles clearly defined the length and nature of student clinical attachments with which GPs were involved.

Six main categories of impacts on the GPs were defined: personal; time; patient care; professional relationships and professional development; practice business and infrastructure; and recognition and remuneration. Each of these is discussed in the following section of this paper.

Personal

The proportion of doctors who reported increased enjoyment when precepting was always high (Shorey *et al.*, 1997; Oswald, 2002; Walker-Jeffreys, 2003). In studies that asked doctors to think of impacts for themselves there was a reoccurring theme that enjoyment increased while supervising medical students (Oswald, 2002; Ampt *et al.*, 2004).

Sources of enjoyment were less explicitly defined in the rural literature (Baker *et al.*, 2003) compared with urban-based studies (Table 1). However, rural GPs were less likely to think that precepting students increased their overall stress level when compared with their urban colleagues (Baldor *et al.*, 2001) (Table 1). Some components of teaching may mitigate stress (Rutter *et al.*, 2002). Active preceptors saw teaching as aiding in their own learning and development and described staying current with medical literature (Grayson *et al.*, 1998).

Time

Both rural and urban GPs consistently reported time pressure when supervising medical students (Slatt *et al.*, 1984; Walters *et al.*, 2003). Despite exceptionally heavy workloads, more than 75% of rural GP preceptors reported spending an average of two additional hours at work on each full day of precepting (Department of Health and Aged Care, 1999). This is somewhat greater than was found in the studies which were not specifically rural (Levy *et al.*, 1997; Ricer *et al.*, 1997). Several themes related to work time have been described across all studies. These are set out in Figure 1.

Some studies have attempted to measure changes in the length of patient consultations rather than estimations of the length of GPs' days. These studies have shown wide variation in results; with a continuum from time saved to time lost (Vinson *et al.*, 1996). Time and motion studies measuring changes in consulting activities show that overall the frequency ranking of physician activities did not alter with the presence of a student, however doctors spent less time examining patients (Frank *et al.*, 1997). Similar findings are described in one Australian rural study (Worley & Kitto, 2001).

Table 1. Evidence regarding sources of enjoyment from precepting

	Rural evidence	General evidence
<i>Evidence regarding sources of enjoyment from precepting</i>		
<i>Personal sources</i>		
Increased enjoyment in practice	(Baker <i>et al.</i> , 2003) no evidence	(Kirz & Larsen, 1986; Vinson & Paden, 1994; Usatine <i>et al.</i> , 1995; Wang-Cheng <i>et al.</i> , 1995; Chambers & Campbell, 1996; Foley <i>et al.</i> , 1996; Fulkerson & Wang-Cheng, 1997; Gray & Fine, 1997; Levy <i>et al.</i> , 1997; Shorey <i>et al.</i> , 1997; Grayson <i>et al.</i> , 1998; Baldor <i>et al.</i> , 2001; Ullian <i>et al.</i> , 2001)
Sense of increased value in their work		(Fine & Seabrook, 1996; Murray <i>et al.</i> , 1997).
<i>Seeing students positive responses</i>		
Motivation and enthusiasm		(Usatine <i>et al.</i> , 1995;
Skill development		Howe, 2000; Kilminster & Jolly, 2000).
<i>Evidence regarding undesirable affective impact from precepting</i>		
Work stress	(Baldor <i>et al.</i> , 2001)	(Baldor <i>et al.</i> , 2001)
<i>Problematic interactions with students</i>		
Conflicting cultures		(Baldor <i>et al.</i> , 2001)
Poor student-preceptor match		
Giving student feedback		
Managing the occasional problem student		(Howe, 2000).
<i>Problematic interactions with programs</i>		
Practical difficulties		
Administrative duties		(Howe, 2000).
<i>Problematic interactions with program personnel</i>		
Negative feedback		(Howe, 2000).

Patient Care

GPs almost universally stated that patient care remained their primary responsibility, and that this was compatible with precepting students (Mann *et al.*, 2001). Rural and urban studies concluded that a majority of preceptors

feel that precepting improved the quality of their clinical practice (Kirz & Larsen, 1986). Themes explored in the non-rural literature are summarized (Figure 2). No rural-specific data were found.

Professional Relationships and Professional Development

Some GP preceptors have described becoming more aware of the role of others in the practice team (Howe, 2000). Key preceptors have described increased interaction with medical schools (Ullian *et al.*, 2001) and increased identification with peers who also saw themselves as teachers (Starr *et al.*, 2003). This reduced professional isolation of rural practitioners (Oswald, 2002) and resulted in professional pride in relation to their role as a preceptor. Some GPs reported an increase in patients' perceptions of their status (Grayson *et al.*, 1998). A small group of GPs described increased recognition in the community as an appropriate reward for teaching students (Howe, 2000). Many preceptors

<i>Work time themes defined in the general literature</i>
<ul style="list-style-type: none"> • Conflicting time pressures resulting in changes in learning culture <ul style="list-style-type: none"> – a lack of observation of learners, – an absence of probing of student knowledge and – a failure of learners to share learning experiences with their peers • Private physicians protect productivity in favour of increased work hours • Solo practitioners more likely to report extra time • GPs have differing adaptive behaviours to time pressures • GPs show poor ability to accurately recollect time taken
(Garg <i>et al.</i> , 1991; Walter <i>et al.</i> , 1991; Fields <i>et al.</i> , 1994; Vinson & Paden, 1994; Irby, 1995; Levy <i>et al.</i> , 1997; Ricer <i>et al.</i> , 1997; Usatine <i>et al.</i> , 1997; Vinson <i>et al.</i> , 1997; Mckee <i>et al.</i> , 1998; Simon <i>et al.</i> , 2003)

Figure 1. Work time themes defined in the general literature.

<i>Patient care themes defined in not specifically rural literature</i>
Common themes regarding students
<ul style="list-style-type: none"> • did not make patients feel uncomfortable • did not interfere with the doctor–patient relationship • preceptors gained new insights into the lives of their patients • patients gave positive feedback about their interaction with a student. • patient selection for students based on the anticipated effect on the doctor–patient relationship
(Kirz & Larsen, 1986; Usatine <i>et al.</i> , 1995; Baldor <i>et al.</i> , 2001; Ullian <i>et al.</i> , 2001; Simon <i>et al.</i> , 2003)
Infrequent themes
<ul style="list-style-type: none"> • teaching might have an adverse effect on patient care • students interfere with the doctor–patient relationship • patients may become overexposed to students • poor patient satisfaction is a small but significant risk which GP preceptors work to avoid
(Kirz & Larsen, 1986; Usatine <i>et al.</i> , 1995; Fine & Seabrook, 1996; Gray & Fine, 1997; Grayson <i>et al.</i> , 1998; Baldor <i>et al.</i> , 2001)

Figure 2. Patient care themes defined in not specifically rural literature.

described wanting to train the next generation and to be seen by the students as role models. They described a desire to pay back the profession (Foley *et al.*, 1996). No data were available regarding rural GPs specifically.

Practice Business and Infrastructure

Having space to accommodate students was a significant issue for many rural practices (Walters *et al.*, 2003), particularly as many practices are already reported to be overcrowded (Fine & Seabrook, 1996). In an Australian study, 55% of practices had a room available for students to consult on an ongoing basis and 26% on an intermittent basis (Department of Health and Aged Care, 1999). There was also concern regarding lack of access to study facilities, important reading material, and internet access for student learning (Kollisch *et al.*, 1997).

Reasons given by rural GPs for teaching, included the promotion of rural practice with the aim to recruit future partners to the practice. University involvement in rural practices has improved recruitment outcomes in rural South Australia (Wilkinson *et al.*, 2003). Recruitment assistance has been valued highest after direct financial and material supports (Langlois, 1995).

The GP teachers' contact with keen students increased not only their morale, but also the morale of the whole practice. This may be due to the increase in teamwork, which is beneficial to the practice (Howe, 2000). Most rural primary care physicians reported that the presence of a medical student did not result in an increase in staff time (Vinson & Padden, 1994).

Accommodating time needed to teach diminished the number of patients seen per clinic session (Ferenchick, 2002). Most rural and urban GPs described a reduction of 6–10 patients per day or 1–2 patients per hour (Department of Health and Aged Care, 1999). Further exploration of productivity is found in mainly urban-based studies (Figure 3).

There was a small but significant group of rural preceptors who described no reduction (Fields *et al.*, 1994) or an increased productivity when supervising medical students (Vinson *et al.*, 1996).

<i>Productivity themes defined in the general literature</i>
<ul style="list-style-type: none"> • reduction in number of patients seen is due to students disrupting patient flow • reduction in patient numbers is highly sensitive to the placement duration • many GPs still reported they believed they did not have enough time to spend with the student • private practitioners protect their productivity by increasing their work hours
(Baldor <i>et al.</i> , 2001; Department of Health and Aged Care, 1999; Garg <i>et al.</i> , 1991; Kearl & Mainous, 1993; Vinson & Paden, 1994; Usatine <i>et al.</i> , 1995; Kollisch <i>et al.</i> , 1997; Levy <i>et al.</i> , 1997; Ricer <i>et al.</i> , 1997; Heath & Beatty, 1998; Ferenchick <i>et al.</i> , 2002).

Figure 3. Productivity themes defined in the general literature.

Recognition and Remuneration

Approximately half the rural preceptors believed student attachments had a negative effect on their income (Barritt *et al.*, 1997), and 40% agreed that precepting students increased practice costs. Physicians in rural private practice found this cost prohibitive and were significantly less likely to agree to precepting a student (Baldor *et al.*, 2001). This was more likely where practices were responsible for student accommodation and learning resource costs.

In an Australian study, the majority of rural GP preceptors agreed that there should be financial remuneration for precepting medical students in their private practices (Department of Health and Aged Care, 1999). Significant numbers of GPs who have been paid have argued that they received inadequate remuneration (Gray & Fine, 1997; Mahnken, 2002). In the past, preceptors have stated that lack of funds would not change their commitment to teaching (Kollisch *et al.*, 1997). However, more recently, increasing pressures from clinical responsibilities have begun to change this (Starr *et al.*, 2003). Other authors have found that “dollars alone were not helpful” (Langlois, 1995) and recognition by the University of the work that rural GPs were doing under difficult circumstances was just as important (Ampt *et al.*, 2004).

Discussion

Where rural and urban studies focused on impacts affecting GP preceptors generally, few articles clearly defined the length and nature of student clinical attachments. In articles defining impacts to preceptors involved in specified types of student attachment or specific medical school programs there was limited discussion regarding whether findings were generalizable. Many studies have argued that the positive impacts of precepting far outweigh the negative impacts, however the risk of under-reporting of negative impacts has been described previously (Howe, 2000).

Only nine empirical studies addressed the impact of medical students on rural GPs specifically. All but one of these studies were Australian, where the majority of studies from the total group of studies were from USA. Personal factors, including satisfaction in teaching, and increased interest in clinical medicine, are the main drivers for the majority of rural preceptors. There is some evidence that enjoyment can be secured with positive feedback from students and increased confidence in teaching and student assessment. Threats to this enjoyment jeopardise retention of rural GP preceptors and considerable program support is needed where negative experiences occur.

Rural GPs consistently report the single most significant pressure when supervising medical students is time management. It is likely that time impacts will differ, depending on how actively the learner participates in patient care, how the appointment system is adapted to manage the presence of students, whether the rotation is block or longitudinal, the point in the student

attachment and how time impacts are measured. More research is needed to unravel these variables. Many authors have failed to make explicit the actual involvement of the preceptor in the medical student program, making comparisons among studies difficult.

The length of longitudinal attachment may affect the impacts on rural GPs. This confounding factor has not been evaluated in assessing differences between rural and urban contexts. One hypothetical model suggests that students became less of a time burden to their supervising doctors in prolonged attachments (Worley & Kitto, 2001); however, this model was extrapolated from two data sets only. Further studies of the effect of prolonged student attachments are required.

In considering professional impacts, further research is needed to define the characteristics of the small group of preceptors who express concerns that teaching might have an adverse effect on their patient care, and validate or challenge their concerns. Most supervisory relationships have a defacto power relationship between the supervisor and the trainee. Individual social position, particularly race, gender, social class and sexuality, also confer relative power. The possibility that demographic relationships between rural GPs and students could change the teaching context, and thereby alter the impacts on the supervisor, has not been evaluated.

If universities are expected to compensate for business impacts, including infrastructure requirements and reported decreased productivity through direct financial payments, current and future teaching may prove to be unsustainable. There are a group of rural practices where these business challenges have reportedly been overcome through adopting various consulting and teaching blends; however, it is not known if this has been at the expense of student learning. Further studies are required into different curricular structures which may minimize negative impacts and measure these against student feedback and performance. Recruitment through mentoring, although reported as an important motivator, is a primary motivator for only a minority of GPs, usually practice principals, who perhaps see student supervision from a more strategic perspective.

Conclusions

There is a paucity of literature specific to rural GPs in this field. However, from the wider literature, we have categorized the impact of precepting students into personal, professional, and business domains. Personal factors, including satisfaction in teaching, and increased interest in clinical medicine, are the main drivers for the majority of rural preceptors. Both rural and urban GPs consistently report the single most significant pressure when supervising medical students is time management. There seem to be some differences in time impacts between rural and urban studies. but country of origin of the

studies and length of attachment are obvious confounding factors. Most rural GPs feel precepting does not negatively impact on professional factors, including patient care. Further studies need to evaluate the differences between these GPs and the small percentage of GPs who have concerns regarding quality of patient care. Business factors including decrease productivity; and clinic space pressures significantly impact on the capacity of some rural practices to precept students.

As universities become more dependent on GPs to deliver significant amounts of medical student clinical supervision, they must develop an explicit understanding of the impacts on rural GPs. Given the emerging acknowledgement of the differences between rural and urban practice, rural-specific studies are required. Furthermore, these studies should evaluate the relationship between the quality of teaching delivered, with the type and length of student attachments, and the likely impacts on rural GPs. As the trend towards longitudinal attachments continues, the impact of these specifically needs investigation.

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Appendix I Solely Rural Studies

Author	Location	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Ampt <i>et al.</i> (2004)	Australia	Rural GPs	All levels	Variable, defined < 6 weeks	Key preceptors	Questionnaire and SSI	Themes included: willingness, enjoyment, time pressure, recognition, communication, payment, community services involvement.
Baker <i>et al.</i> (2003)	Tasmania, Australia	Rural GPs	Year 6 of 6	3 weeks	All in single program	Questionnaire 5-point Likert scale and open questions	Preceptors felt their teaching role had not been well defined, and did not know how their teaching fitted into the curriculum; however, they believed they understood what students needed to learn. Student feedback showed rural preceptors performed well overall but considerable range of scores.

(continued overleaf)

Appendix I (continued)

Author	Location	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Barritt <i>et al.</i> (1997)	South Australia	Rural GPs	All levels	Variable, defined < 6 weeks	Precepted in 1996	3-point Likert scale	Relative perceived effect on GP family and social life, CME, PD, and level of enjoyment.
Fields <i>et al.</i> (1994)	Oregon USA	22 rural practices	Year 3 of 4	≥ 15 days over 6 weeks	Key preceptors, single program	Billing and patient numbers	No sig. difference in billing or patients seen with or without student. Some physicians reported extending their days in order to interact with students.
Mahnken (2002)	Victoria, Australia	Rural nursing and medical student supervisors	Not specified	Unspecified	Unspecified	SSI	PIP not enough to be an incentive to teach
Oswald (2002)	South Australia	4 GP preceptors	Year 3 of 4	40 weeks 2 students per practice	2 clinical sessions per week, plus full-time supervision	Unstructured interviews	Confidence generated among rural preceptors improves their morale, in turn increasing the support for rural programs.
Walker-Jeffreys (2003)	Australia	Rural GPs	Year 1 & 2 of 4	1 week	Undefined	Likert scale	Most highly ranked to statement related to enjoyment of precepting role.

(continued overleaf)

Appendix I (continued)

Author	Location	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Walters <i>et al.</i> (2003)	Australia	Rural GPs	Year 3 of 4	40 weeks	2 clinical sessions per week, plus full-time supervision	Reflective diary	GP preceptor concerns, initial student results. Described initial GP anxiety and early adopters' satisfaction following success.
Worley & Kitto (2001)	Australia	Rural GPs	Year 3 of 4	40 weeks	2 clinical sessions per week, plus full-time supervision	Time-and-motion observations plus log books	Student and practitioner logbooks showed mean length of consultation by a GP was 14.4 min without a student and 9.5 min with a student. Reduced proportion of time spent taking a history, discussion with patient or family, reviewing patient records and doing patient specific paper work.

Appendix II General Studies

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Baldor <i>et al.</i> (2001)	New England, USA	Community-based physicians; 21% rural	All levels	Unspecified median = 2 months/yr	50% any and 50% none	5-point Likert scale, 12 statements ranked in order	Comparison of responses between some demographic groups.
Chambers & Campbell (1996)	UK	620 GP principals in Staffordshire; % rural not specified	All levels	Unspecified	Any or none	Anxiety and Depression Scale	There was a significant association between high depression scores and working in a non-training practice.
Dept of Health and Aged Care Report (1999)	Australia	580 practices urban and rural	All levels	Defined number of days/year precepting	Primary supervisor in clinic	GP Questionnaire	Practice profile 30% had 4–6 GPs; only 16% > 7 GPs. Half of all practices only placed 1 or 2 students. Consistently positive attitude to reimburse ment, regardless of cost reported. Support was very strong when practice management costs are incurred.

(continued overleaf)

Appendix II (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Frank <i>et al.</i> (1997)	Ohio, USA	16 Physicians in community-based primary care with 50 km radius of Cleveland	Unspecified	Unspecified	Volunteer motivated preceptors of single program	Clinical Time Use, measured directly by the Davis Observational Code.	When a student was present there was no time difference but the content of the consultation changed: > time discussing visit expectations and other family member's problem; < time history taking, providing assessment and answering questions No less time spent examining the patient.
Langlois (1995)	USA	147 community preceptors - rural and urban	Year 3 of 4	Unspecified	Single program: unspecified	Questionnaire - 5-point Likert scale	CME credit for teaching was the most valued. Other areas of financial and material support were also valued. Rural preceptors demonstrated significant differences in need ($p < .05$) for

(continued overleaf)

Appendix II (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Levy <i>et al.</i> (1997)	USA	139 community family physician preceptors	Year 3 of 4	3 weeks with plan to increase to 6 weeks 1:1 with preceptor	Single program: unspecified, assumed fulltime	Questionnaire	Neither the reported decrease in number of patients seen nor the reported reduction in practice income was associated with variations in preceptor demographics. 13 types of support, and in all cases they indicated a higher value than their counterparts in suburban or urban locations.
Vinson & Paden (1994)	USA	56 primary care physicians	Year 3 & 4 students	4 weeks	Single program: unspecified, assumed fulltime	Questionnaires to physicians	Mean increase in time spent at work 46 minutes (SD 32.1) but 5 noted no change and 1 noted a decrease. No sig. relationship between the student's feedback and the physician's perception of amounts of extra time spent.

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Appendix II (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Vinson <i>et al.</i> (1996)	USA	22 non- and 12 academic family physicians 86% rural	Year 4 of 4	4 weeks plus 4 weeks	Single program: unspecified, assumed fulltime	Time-and-motion observations	Private vs academic physicians worked 52 mins vs 0 mins longer with a student present for the day. Substantial shift for patient-centred to student-centred work.
Vinson <i>et al.</i> (1997)	USA	Randomly selected AMA listed physicians. Response of office based teachers.	Not specified	10 days	Median of three medical students per year	Postcard questionnaire, then with a 4-page questionnaire	30% respondents had taught clinical students. Teacher demography-younger, male, in group practice. 60% perceived a lengthening of their work day by a median of 30 mins; 30% perceived a decrease in productivity.

Appendix III Solely Urban Studies

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Ferenchick <i>et al.</i> (2002)	USA	Community-based teachers	Unspecified	Unspecified	Any or none	Literature review to determine the impact of teaching on community-based teachers	<i>Affective benefits:</i> satisfaction and pride in teaching. <i>Cognitive Benefits:</i> learning from teaching is an important reward and motivator. <i>Tangible effects:</i> increase by average of 30 min per half day. Recruitment of partners among their learners.
Fine & Seabrook (1996)	UK	17 inner city GPs. Spectrum of backgrounds.	All levels	Unspecified	Variable teaching experience	Qualitative study based on in depth interviews	Themes: <i>Motivation for teaching:</i> enjoy working out how to impart knowledge, gave value to their work, enjoy the one-to-one relationship. <i>Concerns:</i> included lack of time and adverse effect on patient care. Desire for educational, organizational and emotional support.

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Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Foley <i>et al.</i> (1996)	USA	103 community preceptors - metro Chicago	Year 1, 2 & 3	3 years	Yr 1, 1 session per month; Yr 2, 2/mth; Yr 3, 4/mth	Likert scores for 12 statements	Ranked 12 statements relating to motivation to precept. Most agreement for statements relating to contribute to the development of young professionals and give others some of what they had received from medicine.
Fulkerson & Wang-Cheng (1997)	USA	74 current community physicians, urban	Year 3 of 4	1 month	7 half days a week	13-item Likert scale questionnaire	84% found the personal satisfaction of working with students was a motivating factor. The most common response to how their efforts could be best recognised was: clinical appointment. No preceptor directly suggested monetary compensation.

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Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Garg <i>et al.</i> (1991)	USA	Urban community health centre faculty	Sophomores, juniors and seniors	30 months	2 half days per week	Appointment logs.	No. patients seen compared with national average states from Am. MA data suggests productivity reduced by 30–40% when teaching. <i>Rewards:</i> mainly learning from their own teaching. Others: belonging to tutors' group; enhancing the doctor-patient relationship; gains in self-esteem and financial reward. <i>Problems:</i> lack of time; lack of space; lack of confidence; worried of adverse effect on patient care. Undergraduate GP teachers more in tune with intrinsic rewards.
Gray & Fine (1997)	UK	303 GP principals in Lambeth, Southwark and Lewisham (London)	All levels	Unspecified	Any or none	Questionnaire	

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Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Grayson <i>et al.</i> (1998)	USA	185 urban community-based primary care physicians	Year 1 & 2 of 4	16 weeks	1 session per week	Questionnaire	82% > enjoyment of practicing medicine 66% > time reviewing clinical medicine basics 62% decrease no. of patients seen. 49% > desire to keep up to date with recent developments in medicine 44% increased patient perception of their status.
Heath & Beatty (1998)	New York, USA	4 preceptors- unspecified	Year 3 of 4	Unspecified	Single program: unspecified	Examined patient encounter forms	No sig. difference between 5 most common billing codes or 5 most common diagnostic studies ordered.
Howe (2000)	UK	15 urban general practitioners. New program.	Year 4	8 weeks	1-2 students 3 days a week	SSI	Impacts relate to preceptor, practice and student factors. Key facilitating and hindering factors grouped in relation to individual tutor, their

(continued overleaf)

Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Irby (1995)	Any	Doctors in ambulatory care	Not specified	Unspecified	Unspecified	Literature review: effective supervision	<p>practice, the students, and the input of the academic unit.</p> <p><i>Positive Impacts to GPs:</i> feeling they help students develop; the practice teamwork increases</p> <p><i>Negative Impacts to GPs:</i> increased time pressure.</p> <p>Keys to effective teaching included: (1) involving students in the learning process, (2) communicating expectations of student performance, (3) positive modelling of clinical skills.</p>

(continued overleaf)

Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Kearl & Mainous (1993)	USA	Family practice faculty and 3rd year resident physicians - unspecified	Year 3 of 4	Unspecified	Single program: unspecified	Number of patients seen and average charges billed	No significant differences. Only 1.6 patients seen per hour.
Kilminster & Jolly (2000)	Any	Doctors in clinical setting	Not specified	Unspecified	Unspecified	Literature review: effective supervision	Quality of relationship between supervisor and trainee is probably the single most important factor for effective supervision. No adequate theoretical accounts of supervision in medicine. Behavioural changes can occur quickly, changes in attitude take longer. More effective when the student is less experienced. Has a positive effect on patient outcome.

(continued overleaf)

Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Kirz & Larsen (1986)	USA	Salaried, primary care and hospital doctors in a health cooperative - urban	Not specified	Unspecified	Unspecified	Estimate time used solely for teaching and patients seen per half day	Mean response for time used solely for teaching with no patient present was 46.8 min. Nurses estimated the time to be significantly more than the physicians. Objective measurements found a decrease in 1.1 patients per half day.
Kollisch et al. (1997)	USA	33 private practice physicians; unspecified	Year 3 of 4	4 week rotation	4 days a week	Questionnaire	<p><i>Positive outcomes:</i> a positive teaching experience; intellectual stimulation; patients pride; collegial relationships.</p> <p><i>Negative outcomes:</i> increased time management pressures; slowed down the practice; longer hours; <i>Concerns:</i> poor student-preceptor match; evaluating students; lack of resources for teaching; loss of revenue.</p>

(continued overleaf)

Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
McKee <i>et al.</i> (1998)	USA	21 ambulatory care clinical preceptors	Not specified	6 weeks	Single program: unspecified, assumed fulltime	Surveys completed by students and preceptors re teaching time and quality	Patients seen per hour did not differ when a student was present. 30 min or less per teaching time. General conclusions: minimal time spent observing history and examination skills.
Murray <i>et al.</i> (1997)	UK	20 practice-based urban GP tutors. 12 male, 8 female	Year 4 of 6	20 weeks per year	2 days a week; but only 1 consulting session	SSI in tutor's practice	Tutors identified the personal benefits of teaching as development of their own clinical skills and the stimulation of teaching.
Ricer <i>et al.</i> (1997)	USA	26 different preceptor-student pairs- unspecified	Year 3 of 4	4 weeks	17 full day equivalents	Preceptor and student actions timed and categorized	Teaching time categorised into 4 options: (1) seeing pts with student, (2) reviewing student findings, (3) teaching, (4) waiting. Average total amounts of time the preceptor spent with the student was 3.28 hours per day.

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Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Rutter <i>et al.</i> (2002)	Any	Doctors and dentists generally	Not specified	Undefined	Undefined	Literature Review: relationships between a teaching role and stress	4 stressors most predictive of job dissatisfaction and stress were: patient's expectations; interference with family life; constant interruptions and practice administration some evidence that teaching might mitigate stress.
Simon <i>et al.</i> (2003)	USA	14 generalists and 5 paediatricians - urban	Year 3 & 4 students	21 months	1 afternoon per week	SSI	Competing needs of patient (dr-pt relationship), student (educational value) and practice (time and efficiency) the most important factors in selecting patients for teaching.
Slatt <i>et al.</i> (1984)	USA	17 actively precepting physicians - unspecified	Year 3 or Year 4	4 weeks	Single program: unspecified, assumed fulltime	SSI	<i>Advantages:</i> interaction with students, CME, make medical practice more enjoyable.

(continued overleaf)

Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Starr <i>et al.</i> (2003)	USA	35 experienced preceptors - unspecified	Any	Undefined	Undefined	Focus groups systematic content analysis for evidence of themes	<p><i>Disadvantages:</i> considerable extra time, isolation from the department, loss of a stipend not viewed as a major problem.</p> <p>Factors contributing to a strong sense of teacher identity: 4 themes suggested in the social sciences literature for teacher identity where confirmed: (1) intrinsic satisfaction; (2) knowledge and skill; (3) external rewards; and (4) social supports. Three others were identified: (a) the integrated role of being a physician and teacher; (b) feeling a sense of responsibility to teach medicine; and (c) being a representative of their own discipline of primary care.</p>

(continued overleaf)

Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Ullian <i>et al.</i> (2001)	USA	Urban generalist preceptors, 48% family physicians	Years 1 and 2	Over 2 years	At least 75 hours	Surveys, discussions and AGMs & formal reports	<p><i>Desirable impacts:</i></p> <ul style="list-style-type: none"> (1) affective, eg. enjoying teaching; (2) cognitive, eg. own learning; (3) tangible eg. discount on CME. <p><i>Undesirable impacts:</i></p> <ul style="list-style-type: none"> (1) resource problems; (2) problematic interactions; (3) burdensome/ administrative tasks. <p>Length of day varied with student from no extra time to 30–45 min per half day of precepting. Conclusions discuss recommendations for program management.</p>
Usatine <i>et al.</i> (1995)	USA	Urban: 25% female 49% in private practice 21% solo	1–2 first year medical students	4 visits over 4 months	Visiting once a month	Attitudinal survey consisting of 53 items. Then SSI	<p>Enjoyed being a preceptor and interacting with student. Patients reported new, mainly</p> <p style="text-align: right;"><i>(continued overleaf)</i></p>

Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Usatine <i>et al.</i> (1997)	USA	4 exemplary preceptors who claimed to practice more efficiently with student present - unspecified	Family medicine clerks in managed care clinics	Undefined	Undefined	Time-and-motion observations	useful information to students. Positive feedback from patients. 2/89 believed patient would not return to the clinic as the result of a student. In the telephone interview, 17/19 preceptors said the worst aspect of precepting was the time management. 1.1 min more spent on patient encounter when student present. Not statistically significant. This time difference did not include preparing for teaching (done before the student saw the teacher), teaching, giving feedback, orientations or clinical conferences at the

(continued overleaf)

Appendix III Solely (continued)

Author	Country	Preceptor demographics	Student year level	Length of attachment	Teaching involvement	Methods	Results
Walter <i>et al.</i> (1991)	USA	Urban primary care preceptors	Not specified	1 month	6 half-day clinics each week	Time and motion study	beginning or end of the clinic. It also did not include the time savings associated with students helping with charting, which all the preceptors identified as being a major time saver. 16% of time students were based in clinic during 4 hour session the students were interacting with their preceptor.