SURGICAL UNDERGRADUATE TEACHING

AND

COMMUNITY-BASED EDUCATION

New Environments for Surgical Teaching

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ABSTRACT

Community oriented medical education is an increasingly popular concept adopted by the medical school fraternity and aims to produce a more relevant and community-based curriculum for medical undergraduates. One of the philosophies behind community oriented education is that the medical course will address areas of community need as opposed to the needs of tertiary hospitals, the traditional bastions of medical education. An area of community need in Australia is the diminishing rural medical workforce. Rural undergraduate terms may have the effect of encouraging more graduates to practise in the country, while at the same time fulfilling the criteria for community oriented medical education. The aims of this thesis are to establish that there is a community need for rural surgeons and to evaluate whether surgical undergraduate education can be successfully performed outside of the traditional teaching hospital environment.

Research was undertaken to determine the status of the surgical workforce in rural South Australia and to identify factors which may be useful in building a profile of a potential rural surgeon.

The Department of Surgery at the University of Adelaide resolved to address the issue of a more relevant curriculum by implementing significant change within the final year surgical teaching program. Surgical elective terms, including rotations to provincial hospitals, were devised and offered as options for the students. The impact of these country placements upon the students was assessed. The examination results and term reports of the rural surgical students were compared with the students who remained in the metropolitan area for their surgical terms. The Clinical Education Development Unit also conducted an independent assessment of the project at the

University of Adelaide. The results from the group of students who participated in the day surgery attachment, a surgical elective option, were also scrutinised, as this rotation represents another alternative to the traditional ward-based surgical clerkship.

Graduate follow-up studies were also performed on the group who participated in the rural attachments in 1998.

The results of the rural surgical workforce survey confirmed that there is a shortage of rural surgeons in South Australia. Rural surgery and day surgery attachments are as effective as traditional teaching hospital clerkships in terms of objective assessment..

STATEMENT

This work contains no material, which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

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PUBLICATIONS

Several articles directly derived from this thesis have either been published or accepted for publication. There are as follows;

1. Bruening M., Maddern G. "A Profile of Rural Surgeons in Australia" The Medical Journal of Australia, 169, 1998, 324-326
2. Bruening M., Maddern G. " The provision of general surgical services in Rural South Australia: a new model for rural surgery" The Australian and New Zealand Journal of Surgery, 70, 1998, 764-768
3. Bruening M., Maddern G. "Undergraduate surgical education in an ambulatory surgery setting" Ambulatory Surgery, 9(3), 2001, 155-158
4. Bruening M., Maddern G. "Surgical Undergraduate education in Rural Australia" Archives of Surgery, July 2002, 137, 794-798
5. Wemyss-Holden S., Bruening M., Launois B., Maddern G. "The Management of Liver Trauma: Implications for the Rural Surgeon" ANZ Journal of Surgery, July 2002, 72, 400-404
6. Bruening M. , Maddern G. "Surgical teaching in provincial hospitals – Student attitudes towards rural placements" The Australian Journal of Rural Health (accepted for publication)
7. Bruening M. , Anthony A. , Maddern G. "Surgical rotations in provincial South Australia : the trainees' perspective." ANZ Journal of Surgery (accepted for publication)

INTRODUCTION

History of Medical Education

Medical education, in one form or another, has existed since the time of the Ancient Egyptians. The centres of medical teaching were subsequently found in each of the flourishing empires of the Ancient world and although Hippocrates (460-377 BC) is one notable exception, the custodians of medical knowledge were primarily priests and monks. The first example of a truly secular medical school was at the University of Salerno in Italy, founded in the 9th century. This University was the major influence in medicine for several centuries and as its influence waned, other Italian and French universities rose in stature. The medical school concept proliferated throughout the Western world, and teaching in core biological sciences, coupled with ward apprenticeships, became recognised as essential for a student to evolve into a competent medical practitioner.

In 1910, Abraham Flexner, the author of "Medical Education in the United States and Canada: A Report to the Carnegie Foundation for the Advancement of Teaching", isolated several essential factors for the success of any medical school's educational program. These factors included that the scientific basis of disease is taught, research is encouraged, a relevant curriculum is constructed, accreditation occurs regularly and that the medical school is affiliated with a university (Debas 2000). The medical school education system in the United States had up to this time been chaotic and in disarray, but with the advent of the Flexner report, standards greatly improved and indeed, the strategies proposed by Flexner became used as the template upon which the modern medical school model was based. As a consequence of this report and the subsequent changes which occurred, it could also be said that this watershed in medical education history heralded the marriage of medical school to a tertiary hospital base.

Surgical Clerkships

Surgical education of undergraduate students in the later stages of their course has traditionally centred on the surgical clerkship. The predominantly clinically based terms are designed to introduce clinical relevance to the students' learning and provide experience in the environment that the undergraduate will face when their studies are completed. The framework of the surgical clerkship consists of four essential features. These are determining the administrative structure of the clerkship, defining the course content, evaluating the teaching resources available and final evaluation of the student (Numan 1991). From the students' viewpoint the apprenticeship consists of being assigned to a surgical unit and participating in the unit's daily activities, including ward rounds, on-call duties and theatre sessions. These terms have occurred almost exclusively in large metropolitan teaching hospitals. The primary teaching of academic surgeons is often performed in settings such as the outpatient clinic and operating theatre rather than any formalised instruction (Sloan et al 1996). For many students, the commencement of the surgical clerkship heralds the first entry into the operating theatre and the unique learning environment that exists here (Lawrence 1991). Provided that the student undertakes preparatory work, the operating theatre allows the principles of surgical anatomy, physiology, surgical pathology, disease diagnosis and treatment to be taught in a confluent and relevant manner.

The surgical clerkship, despite its integral role in undergraduate education, is recognised to have several limitations. It is often assumed that the knowledge gained from lectures and tutorials during the earlier undergraduate years is automatically applied on the ward and in the operating room. Student learning should pass from a

"passive" phase into an "active" phase, however many students continue to adopt the passive learner role and many of the surgical teaching team are unwilling to alter the status quo (Schwartz et al 1992). Clerkships can often be unstructured and extremely variable in teaching quality, even within the same institution. A recently performed study examined the level of consistency of teaching across eight parallel surgical clerkships linked to a single medical school and found that there was a low level of consistency in the teaching of theoretical topics and practical skills across the different sites (Seabrook et al 2000).

Assessment Methods

Differing teaching quality also translates into potential difficulties if no uniform method of clerkship assessment exists. Assessment methods include subjective ratings, written or oral examinations and increasingly, objective structured clinical examinations (OSCE). The subjective rating is the most widely used method for student assessment and relies upon the surgical team observing their students "in action" (DaRosa 1991). While this form of assessment is valid and universally employed, several limitations have been noted. The assessment forms are traditionally completed at the completion of a student's clerkship and may become a test of memory for the assessors. A major study of grading systems in North American medical schools found that grades provided incentives for the students to perform, provided feedback and exerted a strong influence in obtaining post-graduate training positions (Ravelli and Wolfson 1999). Another significant finding was that an ideal grading system should consist of descriptors with at least four categories, because with only three levels, many assessors were loath to award the lowest mark and

therefore fail students. Historically the essay question has been the principle method of written examination, however since the 1970's other written forms of assessment have been developed including the multiple-choice question and the short answer and Modified Essay Question format (Cohen and Cohen 1991). Oral examination, the oldest evaluation method in medicine, reinforces in students the importance of learning to integrate factual knowledge and the value of approaching clinical problems with sound logic (Papp and Parker 1991). A recent innovation in student assessment has been the evolution of the OSCE. This exam format allows for an evaluation of clinical competence and encompasses data gathering, data interpretation, clinical reasoning, decision making, patient management skills, technical skills, physical examination and inter-personal skills (Cohen and Sachdeva 1991). Rotating students through a series of stations can assess each of these domains. The OSCE can be adapted to meet the needs of any local situation, samples a wide range of clinical skills and can assess competencies not normally assessed in clinical or practical examinations. Surgical educators have found that the introduction of the OSCE has helped the student to focus their learning and provide the opportunity to achieve a more uniform experience and assessment across clerkship sites (Collins et al 1994).

Clerkship Content

A completely integrated and cohesive surgical clerkship is becoming increasingly difficult to design, given the increasing subspecialisation of surgery and consequently many specialty groups are claiming that their specialty is being undertaught (Hamdorf and Hall 2001). Prior to the advent of surgical subspecialisation, a term on a general surgical unit may have included exposure to vascular, urology, plastics and orthopaedics cases. Given current trends in general surgery specialisation, it is feasible to suggest that for the student who is attached to, for example, a hepatobiliary unit, exposure to cases of colonic pathology may be extremely limited. It has also become obvious that the number of weeks spent on surgical clerkships is declining as other faculties, such as emergency medicine, anaesthesia and general practice respectively increase their medical undergraduate exposure. The differences in opinion as to what should constitute "core" surgical curriculum are marked between academic surgical faculty and community-based practitioners. A United States study found that primary care physicians, the equivalent to Australian general practitioners, ranked ENT, Ophthalmology and Orthopaedic topics and skills higher than their surgical faculty peers (Curet et al 1999). The academic surgical faculty questioned in the study felt that topics such as management of the acute abdomen, chest trauma and arterial line insertion were important surgical skills for all undergraduates to acquire, demonstrating a distinct general surgical bias. The differences in curriculum content opinion between academics and those in immediate practice situations are not confined to surgery with a major US study demonstrating conflicts of opinion between those involved in undergraduate primary care education and the group responsible for postgraduate primary care teaching (Osborne et al 1999). Another study discovered that decreasing the general surgical content in a surgical clerkship,

by offering students choice of surgical specialty, made no difference to final exam results in surgery (Poenaru et al 1998). In an attempt to further consolidate the notion that the "undifferentiated" or generalist physician should be the end outcome for an undergraduate course, staff at the Medical University of South Carolina evaluated the effect of a combined medicine and surgery clerkship and discovered that final examination scores for surgery did not alter despite the fact that there was a substantial reduction (four weeks) in students' clinical experience (Blue et al 1998). The results of the aforementioned study differ to those from a retrospective study examining the effect of surgical clerkship duration which found that students who participated in a longer surgical clerkship scored significantly higher on National Board examinations, oral examinations, and evaluations of clinical performance than did students in a shorter clerkship (Jacobson et al 1986).

The Post-Clerkship Effect

Despite the limitations of the surgical apprenticeship system, it remains entrenched in most medical school curricula as an effective learning experience for students. A study of the knowledge gain in a surgical clerkship from the University of Kentucky College of Medicine determined that "a highly significant gain occurred during the problem-based clerkship and that this gain in knowledge was closely related to improved clinical performance" (Schwartz et al 1994). The effect of clerkships in general also has an important role in determining future career paths for students. Student opinions are strongly based on interpersonal experiences with clinical staff and the more enthusiastic and accessible senior staff is to students, the more likely they are to act as positive role models (Remmen et al 2000). The role that surgical

residents play in undergraduate education may also contribute to the students' choice of surgery as a career (Pelletier and Belliveau 1999). A decline in interest in surgical careers in the United States has been partially attributed to the notion that students perceive the life as a general surgical trainee to be too intense and demanding when compared to other career opportunities (Polk 1999). The most recent United States General Surgical selection day where prospective surgical trainees are allocated to surgical training programs, demonstrated the lack of interest in general surgery with a record 68 unfilled positions (Dunnington 2001). Studies of Family medicine clerkships have shown that student attitudes change during the course of a clerkship and that more students preferred family medicine after the clerkship than before it (Senf and Campos-Outcalt 1995).

Surgical Teachers

Responsibility for the surgical education of medical students during their clinical years has traditionally centred upon the consultant surgeon. The role of the consultant as the team leader in the undergraduate surgical clerkship learning experience has remained unchallenged. The surgeon has several teaching arenas available in the form of the operating theatre, outpatient clinics and the ward round and by developing a relationship with the student, many opportunities exist for both teachers and learners to reveal and practice clinical judgement. The role of the resident staff in undergraduate surgical teaching cannot be ignored and several studies have shown that students regard the junior staff as the most important clinical teacher (Remmen et al 2000). Residents would appear to be responsible for teaching technical and patient management skills necessary for patient care (Pelletier and Belliveau 1999). This

resident teaching role also extends to the early post-graduate years and registrars and residents are rated as showing more interest in intern training than consultants (Dally et al 1984). In this Australian study of interns at three teaching hospitals, only 7-13% of interns' time could be identified as educative and there was a common expectation amongst the group that little involvement with visiting consultant staff would occur. Methods of history taking, physical examination, reasoning, learning and relating to other human beings are skills that students can acquire from their clinical teachers (Snow 1989). Assumptions are often made that upon completion of advanced surgical training and subsequent appointment to Medical Schools, the teaching of students becomes an automatically acquired skill, despite the fact that few members of medical faculties receive formalised educational teacher instruction (Crowe et al 2000). A study from Ireland found that while most hospital based consultants were interested in teaching only 34% of specialists had received any teacher training (Gibson et al 2000). Strenuous efforts are now underway by surgical colleges, both locally and abroad to address the issue of teacher training and courses have been developed accordingly (Hamdorf and Hall 2001). In the United States, the emphasis on surgical education based on educational theory has gained increasing importance and one suggested model for a surgical faculty that was dedicated to teaching would be to have a group of trained teachers, a few master teachers and one medical educator (Sachdeva et al 1999).

Educational Theory

The concept of the "adult learner", popularised in 1970 by Malcolm Knowles, a pioneer in adult education theory from the United States, recognises the difference between students in their primary and secondary schooling stages and those in their undergraduate and postgraduate years. The adult learner is someone who wants control and responsibility for their learning, having moved from their earlier educational experiences characterised by dependency. Their learning needs to be relevant to them and is frequently problem centred with a willingness to apply new knowledge immediately. Adults also have an accumulated series of life experiences and knowledge, which can enhance the learning process. Surgical educators who embrace this concept are able to deliver a more effective learning experience to the undergraduate group, by acting as facilitators of learning. This is defined by Knowles as andragogy, the art and science of helping others to learn. By contrast, the art and science of teaching, is called pedagogy. Some characteristics of effective adult learning programs include an environment where students feel comfortable, active involvement in learning is encouraged, being treated as peers and having meaningful dialogue with faculty in terms of feedback (Billington 1988). Experiential learning is a defining feature of adult learning and refers to applied knowledge. An example of this in the medical setting would be if a student attended a clinical skills session on intravenous cannulation and then proceeded to insert a cannula on an inpatient. While the term "adult learner" is of recent origin, it is interesting to note that a famous ancient Greek philosopher named Heraclitis proposed that the best learning environment is learner centred, process- oriented and involves active learning (Dunnington 2001).

The four fundamental elements that shape effective adult learning are motivation, reinforcement, retention and transference.

A student will be more motivated to perform well if he or she understands what is going on. By establishing rapport with students and preparing them for learning, instructors can provide motivation. It is important to hold the learners'attention and make them want to learn. This may include providing feedback and defining clear objectives prior to course commencement.

Through reinforcement, teachers can encourage correct methods of behaviour and performance. Two types of reinforcement exist, positive and negative.

If students can see a meaning or purpose for information being taught, then the information is more likely to be retained. The amount of practice during the learning process, will also directly affect retention.

Transference is defined as the ability to use the information taught in the course but in a new setting. This phenomenon is most likely to occur when participants can associate the new information with something that they already know, the information revisits a logical framework, the participant's degree of original learning was high and the information learned contains elements that are extremely beneficial on the job.

Adult learning strategies are also vital in the post-graduate years, with an increasing emphasis on experiential learning and goal orientation. A British study of 52 basic surgical trainees investigating learning techniques concluded that the predominant learning styles were convergent (or problem solving) and accommodative (or hands on experience) (Drew et al 1999). In many ways, the traditional surgical clerkship with an emphasis on participation and practical learning embraces the concepts underlining Adult Learning theory and it could be argued that experiential learning infiltrates the whole of medical education (Dunne and Chaputte de Santonge 1997).

Community-Based Medical Education

During the past 20 years, it has become apparent that medical education no longer reflects the changes that have taken place in the community. The traditional model of undergraduate education is characterised by being confined to the teaching hospital environment, focusing on rare disease treated with the latest and most expensive treatment options. The notion of a treatment team, consisting of multiple health professionals, is often ignored in favour of the doctor being the central person in charge (Okasha, 1995). While the teaching hospitals remain the bastions of post-graduate specialty training, they fail to provide an adequate basis for a generalist post-graduate career (Holden, 1984). The majority of medical graduates become general practitioners, yet most of undergraduate teaching relies on specialists based in teaching hospitals (Habbick and Leeder 1996). Put into context, less than 10% of graduates enter specialist surgical training (Prideaux and Marshall 1994) and surgical undergraduate education must be aimed at the undifferentiated graduate in order for all doctors to be proficient at recognising surgical disease at the primary care level (Schwartz et al 1992, Snow 1989). It appears that at the precise moment when Flexner made his recommendations in 1910 leading to the amalgamation of medical teaching with the tertiary hospital, the split between medical education and the community at large occurred.

In his 1995 dissertation on the state of world health education, the Deputy Director General of UNESCO stated, "medical student training needs fundamental change, sites for learning beyond the classroom and laboratory, and sites for clinical training beyond the traditional teaching hospitals" and went on to remark that"the community

at large should form the training environment for doctors of the next millennium" (Badran, 1995).

The push for community based education has gained significant momentum over the past decade and the more innovative medical schools are embracing this concept. A curriculum is thought to be community based if " it consists of an appropriate number of learning activities in a balanced variety of educational settings, ie. in both the community and a diversity of health care services at all levels, including the tertiary care hospitals" (Badran 1995).

An example of community based medical education is the use of the ambulatory care or outpatient setting as a learning environment. This has proven to be an ideal model for surgical subspecialty teaching in particular (Poenaru et al 1998).

Universities and medical schools can no longer afford to remain oblivious to the needs of the community at large (Ledingham and Lamphear, 1995) and it has been speculated that if these needs are ignored, the resources given unreservedly to the medical schools may be directed to other bodies willing to assume the mantle of providing the community with what it wants (Schroeder et al 1989). The available research on medical education and the mission statements of official bodies emphasise the failure to provide adequately for a medical workforce that is prepared for the effective delivery of primary care (Bloom 1989). This concept of medical school social accountability is becoming increasingly important and should influence the ability of its medical education programs to ensure that the graduating doctors have an optimal "fit " in society (Bordage et al 1998).

Community Need – The Rural Medical Workforce

A current example of community need in Australia is reflected by the maldistribution of health resources between city and rural areas, resulting in a chronic shortage of medical practitioners in the country regions. Definitions of what constitutes "rural" abound, but for the purposes of this thesis, the Rural and Remote Areas classification will be used which states that all non capital city urban centres or statistical local areas with a population of less than 80,000 inhabitants can be termed rural (Gadiel and Ridoutt 1994).

The disparity of medical services between city and rural areas has also been described overseas, especially in the United States and Canada (Easterbrook et al 1999, Jonasson et al 1995). The critical shortages of all types of medical input and services in Third World countries are staggering. For example, the surgeon to population ratio in Mozambique is calculated at 1:400,000 (Blanchard et al 2001). In Australia, general practice and obstetric services have occupied the media headlines, but the question of surgical services and who provides them has remained largely unanswered.

Rural general surgeons have for many years been integral in providing quality specialist care to the rural community. In many instances, the surgeons have been adept at a wide range of procedures covering a number of surgical subspecialties (Tulloh et al 2001).The rural general surgeon also has a pivotal role in the management of acute trauma. Given the location of provincial hospitals, generally on major traffic routes, motor vehicle accidents are the major source of trauma, in addition to work-related farming injuries and sporting accidents. The surgeon's responsibilities may include coordinating trauma care in the community, performing the necessary techniques to achieve optimal resuscitation, liasing with trauma centres

and providing definitive care for a subset of patients with no need for subspecialty input (Bintz et al 1996). Resident specialist services also have the capacity to save country patients financial burden. A recent study from Western Australia has found that a saving of over $AUD1077 was made per specialist consultation when accessing a local rather than a city-based surgical service (Rankin et al 2001). The importance of the role of the resident general surgeon is unquestioned, yet evidence would suggest that fewer surgeons are taking up the challenge of rural practice. Recent estimates are that there are 15 rural towns in Australia that could support a general surgeon, but currently are without one (Green1999). Forty-five towns throughout rural and remote Australia have one or two surgeons only (Bilenkij 2001). It has also been calculated that Victoria will require two new surgeons to enter rural surgical practice each year for an indefinite period (Faris 1997).

South Australia is an extreme example of an urbanised state with 1.2 million people, representing 80% of the total population, living within a 100km radius of Adelaide (ABS, 1996). A report by the rural group of the Royal Australasian College of Surgeons (RACS) noted that of 361 surgical fellows registered with the South Australian Branch of RACS, only 10 gave their practice address as being outside the metropolitan area (Nettlefold, 1997). Many suggestions have been put forward as to why there is a problem in attracting and retaining medical practitioners in the country regions. The current turnover rate for a general practitioner is in the order of seven years (Shepherd, 1995), but little information is available regarding the longevity of rural surgeons in any given location. Another problem looming on the horizon relates to the aging of the surgical workforce. The 1997 AMWAC survey of the General Surgery Workforce in Australia determined that 38.7% of the workforce were aged 55 years or over. It has been estimated that if all of these surgeons were to retire over the

next ten years, an average loss of 47 surgeons per year would occur. Canada, another country with rural surgical workforce problems, has a similar age profile with respect to rural surgeons, with 30% of the currently practising provincial general surgeons over the age of 55 (Leia-Stephen 2001).

Increasingly, occupational health and trade practice issues may also have a negative impact on the rural workforce. The Australian Medical Association has been influential in seeking changes in working hours for junior hospital doctors (AMA 1999). With these reductions in working hours now enshrined in industrial awards, it is not impossible to predict that with time the same occupational health issues will affect specialist work practice. This will have major implications for the single or two-surgeon practice. For example, if a surgeon operated on a patient with an acute abdomen at 2 am as a matter of emergency, industrial law may prevent them from consulting or operating that morning. If the surgeon chose to ignore this ruling, any possible adverse events that occurred subsequently may have serious legal ramifications.

The Australian Competition and Consumer Commission (ACCC) has recently launched a foray into the enforcement of the Trade Practices Act into the Health sector (Gray 2001). This would have implications if the surgeons in a regional centre had agreed to focus on particular fields of interest and thereby influence referral patterns or if surgeons in neighbouring centres participated in a shared roster system for weekends and holidays. An inquiry into the impact of competition law on rural doctors will be launched, but it is anticipated that the Federal Cabinet will sign-off on the inquiry, despite claims the move could undermine national competition policy (McKenna 2001).

Current Initiatives

The solutions offered by various groups to resolve the rural crisis are many, but to date have failed to significantly increase numbers in the country and invariably are directed at general practitioners. Attractive relocation grants and financial packages have been developed to entice potential rural general practitioners, yet no analogous incentives exist for potential rural specialists. Geographic provider numbers have also been suggested, but the prospect of bonded service has been regarded with scepticism (Griggs 1995). The Federal Government has introduced Medical Rural Bonded Scholarships for medical undergraduates which, while paying the student $AUD 10,000 per annum for each of their undergraduate years, locks the student in to six years of compulsory rural service following the completion of their training programs. The scholarship aims to encourage students who come from rural areas to pursue careers in medicine and it is anticipated that 80 scholarships will be awarded in 2001. Overseas-trained doctors have been recruited to provide medical services to country areas that have been unable to attract local graduates. To date, the use of overseas-trained doctors has been largely limited to general practice. Improvement in locum services is seen as an important measure to provide support for current rural doctors and major efforts are underway by the rural divisional group of the RACS to establish a national rural surgical locum scheme.

Factors influencing Rural Practice

These measures are largely Commonwealth government initiatives directed at luring post-graduates to rural positions. Long-term strategies are being developed at the medical school level. It is now generally accepted that students are more likely to pursue a post-graduate career if they have had good exposure to rural medicine as an undergraduate (Rolfe et al 1997). Several Australian studies have demonstrated that even early short exposure to rural medicine had a positive influence on student's attitudes (Talbot and Ward 1999, Peach and Bath 2000). Studies in the United States over a 9-year period at the Morehouse School of Medicine in Atlanta, determined that there was an association between the rural clerkship experience and the stated preferred career choices of the students (Jones et al 2000).

Growing up in a rural community is also thought to influence a medical student to choose a career in rural medicine (Kamien 1990,Rabinowitz 2001). A Canadian study determined that doctors who were raised in rural communities were 2.3 times more likely than those from non-rural communities to choose to practise in a rural location (Easterbrook et al 1999). In Norway, a rural medical school was developed to embrace these two concepts by increasing the quota of local medical students into its program and by being completely located within a rural region. The medical school clearly had a beneficial effect with follow-up surveys demonstrating that 56.1% of its graduates remained within rural areas (Magnus and Tollan 1993). In Japan, similar results were observed at a rural medical school with 42% of the school's 1871 graduates working in rural regions in 1995 (Inoue et al 1997).

Rural Content in Australian Medical Schools

Participation of undergraduates in rural attachments is variable amongst Australian medical schools, but on average has been of 2 weeks duration during the standard 6-year course (Hickner 1991). In line with the world wide trend towards community based education, a number of Australian medical schools are now incorporating an increased commitment to rural attachments within the undergraduate program. Third year students at Newcastle University medical school spend two months in regional and rural hospitals (Hamilton 1998). The post-graduate course at Flinders University in Adelaide, South Australia, provides students with the option of spending an entire year in the rural Riverland region as part of the undergraduate course. The Parallel Rural Community Curriculum (PRCC) was trialed in 1997 with a total of eight volunteer students spending their fifth year, (of the then six year course), in the Riverland region of South Australia. Several government advisory groups are now calling on medical schools to increase the rural exposure of undergraduates (AMWAC 1996), with a suggested minimum of 8 weeks of rural attachments during the medical curriculum. In recent years the creation of rural medical schools has also occurred. Academic units are being located in rural centres with the final aim being the establishment of ten University Departments of Rural Health (UDRHs) and eleven rural clinical schools. Several of the UDRHs and clinical schools are already in existence, most notably at Wagga Wagga, New South Wales and Townsville, Queensland (Lawson et al 2000). The rationale for establishing medical schools in regional Australia is that up to now it has been thought that the city-based medical schools select mostly metropolitan based students and then provide little, if any, medical education experiences outside of the metropolitan area. A recent study from

the University of Melbourne investigated the relationship between medical students' background and willingness to train as a rural doctor and concluded that students from a rural background were more willing to be trained or to work as doctors in rural areas (Azer et al 2001). The regional medical school selects a "different kind of student for a different kind of course that matches the regional mission focusing on rural and remote, Indigenous, and tropical healthcare issues" (Hays 2000).

Rural Surgical Attachments

The vast majority of the increased rural input within the medical schools focuses on general practitioner attachments. Minimal literature exists regarding surgical placements within the country setting despite many Australian Universities having long established surgical undergraduate rotations in provincial hospitals. A study from the University of Western Australia compared the student experiences in rural specialty and metropolitan teaching hospital practice and determined that there was a strong academic argument in providing students with more opportunity to experience rural specialty practice (Kamien 1996). The study, performed over a 3 year period, focused on rural rotations in psychiatry, internal medicine, obstetrics and gynaecology and paediatrics and compared learning experiences between the rural students and a matching group undertaking the same terms in the metropolitan environment. All but 3 of the 28 students who participated in the project expressed positive feedback regarding the teachers and the rotations and at the time of publication, the researchers found no statistically significant differences in final year exam results between the rural and metropolitan groups. The Flinders University PRCC project did acknowledge the input of local surgeons with regard to skills acquisition and

innovative group building exercises (Worley et al 2000). While the numbers of PRCC students were relatively small, in terms of examination results and class rankings, the PRCC group outperformed the city group. The American situation has been documented and the studies suggest that the quality of surgical undergraduate education obtained at community teaching hospitals was at least equivalent to the principal teaching hospital (Imperato et al 2000). Although not strictly rural, the community hospitals in this study did represent a "change " from the usual tertiary hospital setting. Three community hospitals were compared with the principal hospital and in general the overall examination results amongst all the hospitals were similar, although the smallest community hospital did show statistically significantly higher results for the final written and oral examinations. Subjective evaluation of the students' perception of the overall quality of their rotation revealed significantly higher gradings for the 2 smaller community hospitals when compared to the largest community hospital and the principle teaching centre. An extensive UK study of a third year undergraduate surgical syllabus across different sites, including both traditional teaching and district general hospitals, at King's College Medical School demonstrated that despite a wide variability in the clinical experiences of the students at the different sites, there were no significant differences in examination results between the student groups (Seabrook et al 2000).

Problems faced with Community-Based Medical Education

The introduction of community based medical education does present some dilemmas. The resistance to change in the traditional medical schools is significant and academic leaders will need to be persuaded that community teaching does not mean a decrease

in the quality of education (Bruce 1996). Teaching in General practice and Community Hospitals has been reported to be more educational and enjoyable than in the Tertiary Hospitals and community teachers were more likely to model positive teaching attitudes (Johnston and Boohan 2000). At the post-graduate level, a Canadian study determined that learning was comparable between trainees in urban family medicine programs and those in rural community-based programs (McKendry et al 2000).

Along with the change towards a community-oriented education, the other significant change within medical education has been the introduction of problem based learning (PBL) (Finucane et al 1998). PBL, another example of experiential learning, encourages promotion of student- directed learning and represents a dramatic shift from didactic lectures, is often found in the more innovative medical schools and therefore also in those very same schools promoting a community based medical education. While PBL has been used extensively in the early undergraduate years, future trends may see its introduction into the later years of the medical undergraduate course. The acceptance of PBL also implies the adoption of the undergraduate as an "adult learner " (Schwartz 1992). The concept of PBL may be foreign to the community-based teachers and given the ambivalence towards formal teacher training demonstrated by medical educators, it may prove a difficult package to sell (Finucane et al 1995). Evidence is now emerging that PBL is preparing undergraduates for "life-long learning". An Australian study from the University of Newcastle in New South Wales, compared graduates from traditional and non-traditional (PBL) medical schools and determined that the graduates from the PBL-based medical schools felt more prepared for practice in areas such as interpersonal skills and self-directed learning than their colleagues from traditional medical schools (Hill et al 1998).

A significant problem with medical education based in the community is financial cost, with acknowledgment that community education is expensive (Hensel et al 1996). One study from the United States has estimated that the cost of primary care education in the Ambulatory setting is 24-36% higher in terms of operating costs than in traditional teaching sites (Boex et al 2000). This raises the question of remuneration and recognition of the community teachers. A 1998 United States study of 100 medical schools, discovered that 96 were using community preceptors and that a clinical academic appointment was the most common compensation (Fields et al 1998). While some parties would argue that the teachers are primarily motivated by personal satisfaction (Fulkerson and Wang Cheng 1997), this alone is inadequate recompense. Suggested methods of reward for community teaching are via the conferring of academic titles, awarding continuing medical education points and financial reimbursement (Barritt et al 1997).

A potential problem from the student's viewpoint is that they may lose access to teaching hospital based lectures and tutorials, in addition to having limited library facilities at the community sites. One solution could be to decrease the amount of "core" lectures and plan a greater emphasis on clinical exposure and self-directed learning (Prideaux and Marshall 1994). An alternative more expensive solution would be to provide telemedicine facilities at all community locations and relay lectures and tutorials from the city to the country. Examples abound of telemedicine being applied for educational purposes. In the early 1990's the University of Belfast was the first university in the world to appoint a chair of telemedicine and academic departments worldwide are following suit. While the costs of videoconferencing units have decreased, the major expense has been related to the use of the necessary connection

link, the integrated services digital network. Telemedicine as a teaching tool has been used with success in Australia at both the undergraduate and postgraduate levels (Almehdi et al 2001).

The problems faced with the establishment of community based medical education are significant, but not insurmountable. The main benefit of this form of education in meeting the needs of the community, as distinct to meeting the needs of an academic medical school has been mentioned previously. Another reason why medical education must become community based is the fact that the traditional teaching base is eroding due to external factors, beyond the control of individual medical schools or surgical departments.

Problems with the Traditional Teaching Environment

Economic constrictions are affecting health care delivery, and as a consequence, medical education worldwide (Steele and Doyle 1994). In Australia this has impacted upon surgical education and become more pronounced with the introduction of casemix funding. Increased numbers of emergency admissions and reductions in elective surgery due to bed shortages have altered the "mix" of patients available for undergraduate teaching (Prideaux and Marshall 1994). Surgical conditions once admitted the night prior to the intended procedure are now either being performed in day surgery units or being admitted on the morning of the operation, thereby further denying the students exposure to surgical problems. The opportunities to follow surgical cases post-operatively within the metropolitan hospitals have decreased with the advent of rapid patient turnover and increasing reliance on home nursing services.

A further development in the provision of medical services in general has been the increasing use of the private sector with a subsequent increased focus on fiscal accountability (Steele et al 1994). Changes in hospital funding systems have resulted in teaching and research not being considered as "core activities" under the new casemix funding system (Phillips 1998). The recent increase in private health membership in Australia may also translate into less surgical learning opportunity for medical undergraduates. The academic teachers themselves also have an increased clinical service commitment, decreasing the time available to teach students (Collins et al 1994). A study performed in a University Hospital Radiology department in Philadelphia, USA found that faculty members with higher levels of clinical productivity showed significantly lower levels of academic productivity (Eschelman et al 2000). Despite patient's attitudes towards students being generally positive in relation to the "learning experience" (Richardson et al 1986) and more recent evidence suggesting that surgical trainee education is well received and considered important by patients (Cowles et al 2001), medical ethicists are beginning to question whether there is any obligation on the patient to submit to use as teaching material for undergraduate students (Waterbury 2001). All of these factors have resulted in a markedly different tertiary teaching hospital environment from that encountered even 20 years ago.

Alternative Teaching Opportunities

This overall situation has led to the rise of day surgery units as teaching environments however in general, they remain underutilised as a source of student teaching (O'Driscoll et al 1997, Seabrook et al 1997). Day surgery has evolved in recent years

to become an important contributor to the overall surgical activity in hospitals. Increasing numbers of procedures are now being performed in day surgery units and early estimates that 50 per cent of all procedures could be performed on a day-only basis, have been exceeded in most developed countries (Jarrett 2000). An international survey examining a reference list of potential ambulatory procedures found that in 1997, 57.9% of these procedures were being performed as day surgery (Lathouwer and Poullier 2000). Stand-alone day surgery units are now a feature of most modern hospitals and are run by staff, clerical, nursing and medical, who are in tune with the different demands that occur with ambulatory surgery. The units are not designed to cope with large numbers of medical students and for the time being can only be seen as placement options for students. One of the potential problems encountered by students on a day surgery unit, is that the patient's time is a valuable resource and is sought by ward clerks, admitting nurses and anaesthetists. The student needs to learn to adapt their history and examination-taking techniques to fit in with the pace of the day surgery unit. Some may argue however that the time pressure experienced by the students when admitting their patients, more closely resembles the situation in the outside world and thus may be more relevant. Nevertheless, the day surgery environment remains an impressive source of medical student teaching with regard to exposure to a wide range of common surgical conditions no longer performed in an inpatient setting. It also allows the student, in the space of a few hours, to follow the patient from the point of admission to the point of discharge. Although some traditionalists may dismiss this approach as "take-away" teaching when compared to the standard clerkship, the opportunity to perform history and examination, explain the procedure, participate in the anaesthetic, operative procedure and recovery stages presents itself in a logical and concise manner. Given the

increasing emphasis on same day admissions for elective inpatient surgery, the day surgery unit may represent one of the few remaining environments in which students can practise history and examination on a preoperative patient.

Ambulatory or outpatient clinic teaching is another alternative to the inpatient ward setting. Students who participate in ambulatory clinic teaching have remarked that there is a wide breadth of clinical problems, immediate feedback from the tutors can occur and an increased sense of contributing to patient care is felt (Farquhar 2000). The increasing use of information technology has also been suggested to fill the gap left by the dwindling teaching pool within the major hospitals. Recent work has shown that computer–aided learning can be a valuable tool in medical education (Devitt and Palmer 1998), but can this be expected to completely replace the surgical apprenticeship for senior students? The use of standardised or simulated "patients" has addressed some of the ethical problems related to the use of inpatients as teaching material (Baerheim and Malterud 1995), but whether this can compensate for the clinical signs, management and procedural skills obtained on surgical clerkships is questionable.

Post-Graduate Surgical Training

If medical education is seen as a continuum from the undergraduate years through to the post-graduate years and beyond, the same factors affecting the medical students will impact upon the doctors entering training programs. Increased patient turnover and increasing specialisation of surgical units presents the trainee with the same dilemma as the undergraduate student with regard to exposure to common surgical conditions (Larkins 1990). Consultants are under pressure to perform more procedures

per operating list and are less likely to have time to instruct trainees. Increasing working hours may be one response to solve the trainee "exposure" problem, but while long working hours might seem to imply better training, this does not necessarily translate to more supervision (Kay et al 1996). The uncritical acceptance of assuming that depth of learning will be related to the duration of the placement in a particular specialty has been unchallenged (Buckley 1995). However, one major criticism of experiential learning is that the quantity of experience is not necessarily connected to its richness or intensity (Greenfield 1995). For example, 20 years of surgical experience may amount to the same experience each year for 20 years. Using the same analogy, two trainees who have recently passed their fellowships, but trained in different locations may have vastly differing surgical experiences.

In recent times in the U.K. with the push towards specialist certification, additional methods to increase educational efficacy have been examined (Calman 1995), reinforcing the roles of surgical teachers and having the potential to improve the continuum of medical education. The process of certification is predicted to lead to increased teacher training and educational research.

Specialist training builds on undergraduate education and should be coherent with it (Bayley 1995). Any change in medical education towards a more community oriented base, should involve a similar change in post-graduate training philosophy. Part of the difficulty of devising an educational program that flows seamlessly from the undergraduate through to the postgraduate stages is that separate educational bodies have typically taught the many stages of medical education (Brooks and Goulston 1998). In Australia, the undergraduate years are the responsibility of the Universities, education in the years immediately following graduation fall under the control of the individual hospital and the relevant college conducts postgraduate specialty training.

In recent times, the importance of clinical education during the first two post-graduate years has been recognised. The first postgraduate year in particular is significant for the development of clinical skills (Marel et al 2000). Postgraduate medical education bodies have been established to oversee quality control, hospital accreditation for training and greater accountability of individual hospitals in their training of junior doctors (Prideaux et al 2001). Many Australian Teaching hospitals now have Directors of Clinical Training to coordinate the development of educational programs for junior doctors.

There is evidence that attitudes are changing within the specialist colleges, with a realisation that the needs of the community need to be more appropriately served. In Australia, a comprehensive study of the specialist workforce in rural areas discovered that most colleges favoured the inclusion of a compulsory rotation through a provincial hospital (Gadiel and Ridoutt 1994). The perceived benefits were considered to be potential workforce supply, immediate supplementation of service, development of standards and motivation of rural resident Fellows. Overseas studies have shown that residents rate the rural learning experience higher than the city rotations, rural hospitals with residents admit more patients and subsequently attract financial reward and rural hospitals with training attachments were more likely to recruit and retain staff when compared with rural hospitals without training attachments (Connor 2000, Connor et al 1994, Dewitt et al 2001). Several colleges, including the Royal Australasian College of Surgeons, have instituted rural placements as a component of their respective training programs.

Evaluation of Educational Initiatives

To establish whether an educational program change has been successful, assessment of the outcome measures is required. Four general forms of educational evaluation have been classified (Wilkes and Bligh 2001). Each evaluation is oriented towards an individual group involved with the entire teaching process – students, programs, institutions and stakeholders. For example, student oriented evaluation would focus on examination results, while institution oriented evaluation would involve assessment of the quality of teaching by an external organisation.

Criticism has been made that research about community based education depends largely on subjective reports from teachers and students and little well developed theory exists (Shipengrover and James 1999). Others would suggest that qualitative research is absolutely vital in medical education innovation or change (Murray 1998). Feedback from students and teachers remains an important outcome measure, albeit subjective. A more objective outcome measure is end-of–term or final exam scores of the students undertaking the new curriculum change compared to those students completing the traditional course. This represents a relatively short-term outcome measure. In the United States, 8 medical educators from separate medical schools formed a group to share information regarding curriculum design and evaluation (Gerrity and Mahaffy 1998). While each school had separate evaluation programs, many of the measures were similar, using quantitative methods such as exam results and choice of specialties and qualitative measures including student feedback. The group of evaluators also concluded that communicating the results of evaluations with faculty and students was essential to successful curricular reform.

A long-term outcome measure would involve how the graduate performs as a medical practitioner and ultimately whether they meet societal needs (Shipengrover and James 1999). Graduate follow-up studies can provide valuable insights regarding how well graduates perceive their undergraduate years to have prepared them for their working life (Distlehorst 2000). While there have been several graduate follow-up studies with regard to rural community medicine placements and eventual practice location, very few examples exist of similar studies with specific reference to rural surgical undergraduate attachments and future career path. A report published in 1981, documented the experience from the University of Louisville with their rural surgical clerkship in terms of the effect the program had on the eventual residency choices made by the graduates (Martin et al 1981). The career choices of graduates over a four-year period were evaluated and it was discovered that 26% of the rural group chose family practice residencies, compared with 16% of the urban group. Educational evaluation is an evolving field and is striving to approach the "traditional' clinical research standards of experimental design, reliability and validity (Hutchinson 1999). Increasing interest from general medical journals in the field of medical education research, prompted an English group of medical education researchers to publish guidelines for the evaluation of papers on educational interventions (BMJ 1999). It is anticipated that by exposing more doctors to published literature regarding medical education research in journals of broad readership, the barriers to evidence based medical education will be overcome (Petersen 1999).

METHOD

Surgical Services in Rural South Australia

A list of all public and private hospitals in South Australia was obtained from the South Australian Health Commission. For the purposes of this study, the term rural was regarded as any location situated outside of the outer metropolitan area of Adelaide. Those hospitals within the survey population as defined by the Australian Bureau of Statistics boundaries (ABS, 1994) were identified and a questionnaire was sent to each of the respective chief executive officers. Questions asked included whether there were operating theatre facilities at the hospitals and whether general anaesthetics were being performed. The frequency of elective and emergency surgery was asked, as was an estimate of the number of cases performed per year. Who performed the anaesthetic, emergency and elective surgery was asked, as were the number of transfers to the larger regional hospitals and Adelaide, and the availability of selected surgical subspecialties (Appendix I). The major regional centres referred to in the text are Whyalla, Pt.Augusta, Pt.Pirie, Mt.Gambier and the Riverland region (Appendix II). The study was conducted in October 1997.

A Profile of a Rural Surgeon

The mailing list of all members belonging to the Provincial Surgeons of Australia was obtained. This is an organisation that exists for the sole purpose of holding an annual conference at which rural surgeons can meet and discuss issues of relevance to them. Over two thirds of Australia's non-metropolitan surgeons are members of this organisation. Surgeons residing in towns of less than 50,000 inhabitants were identified and questionnaires were sent.

From the postal list, it was not possible to differentiate the surgical subspecialties amongst the group, however it has been assumed that the vast majority of individuals would fall into the general surgeon category.

Questions asked included sex, age, marital status, number of children, length of time in current practice, location, qualifications, spouse employment and hours worked per week. Surgeons were also asked about the negative and positive aspects of their rural practice (Appendix III).

The study was conducted in February 1998.

Rural Surgical Student Placements

For many years, the sixth year surgical program at the University of Adelaide has comprised of the traditional surgical clerkship. This term was of eight weeks duration and students were assigned to a general surgical unit in one of several metropolitan teaching hospitals affiliated with the University of Adelaide. The undergraduates were expected to take part in the unit's daily activities and perform as a "student intern". A lecture program for all final year students was also in place and it was accepted that students would leave their ward duties to attend these lectures once a week. A ward assessment sheet (Appendix IV) was completed by the head of the unit following the student's term and surgical knowledge was also assessed at the end of the year during the final exams in the form of an OSCE and written examination.

The department of surgery at the University of Adelaide has provided surgical services to Port Augusta for several years. This commitment consists of a weekly rotation of departmental surgeons to Port Augusta, providing twenty four-hour cover. For many of the academic surgeons, this was their first taste of rural surgery. The teaching potential of the provincial hospital was realised and moves were made to establish student placements in Port Augusta and also in another provincial hospital with close university links, Port Pirie. Initially it was thought that all students would be rotated for two-week terms through either of the two hospitals as a compulsory measure. In late 1997, several other hospitals, Whyalla, Port Lincoln and Mount Gambier also became interested in providing terms for final year students. Consultations with the respective chief executive officers and local surgeons were held and it was resolved that a four week term would appear to offer the best compromise in terms of student logistics and pressure on the surgical staff to teach. It was also recommended that the rural term be made entirely voluntary. Two of the

hospitals, Port Lincoln and Whyalla, were already taking medical students from Flinders University for surgical terms at various stages throughout the year, and consequently it was decided to send only one student per term to these locations. The remaining hospitals had the capacity to accept up to two students per term. Each surgeon participating in the program was provided with a comprehensive syllabus outlining the expectations and aims of the final year program, however the teaching format of the rural term was left entirely to the discretion of the individual surgeon. With the commencement of rural surgical placements, the entire final year program was restructured. Instead of a single eight-week student internship at a major metropolitan hospital, the students would now undertake a four-week teaching hospital term and a four-week selective community ambulatory placement or "SCAP".

Options for the SCAP's included the rural surgery term, day surgery or any number of surgical subspecialty units. Assessment of the surgical students would continue to be based on the preceptor assessment forms (Appendix IV) and would be completed at the end of each term.

Once the arrangements for the new surgical program were confirmed, the prospective final year students for 1998 were informed of the impending changes and were given a chance to indicate whether they wanted to undertake a rural surgical term and in which location. A survey form was distributed to all of the students and following the return of the forms; a roster was constructed for the 1998 academic year (Appendix V). As the program was a radical departure from previous years, some flexibility was given to students who changed their mind following the summer break.

For the students who decided to select a rural term, a specially designed logbook was constructed (Appendix VI). The logbook contained the names and numbers of

important contacts, maps of the hospital locations, the aims and objectives of the sixth year syllabus and pages to record their operative and clinical experiences, both in the country and city attachments. There was also a section within the logbook where the students could record any comments, positive or negative.

The Clinical Education Development Unit (CEDU) at The Queen Elizabeth Hospital in Adelaide was enlisted to provide an independent evaluation of the program. This unit had previously been commissioned to evaluate the new rural program (PRCC) at Flinders Medical School. Student participation in the CEDU evaluation was voluntary. The CEDU evaluation was in the form of a comprehensive survey and covered areas such as, intern opportunity by location, practical experience gained, reinforcement of course objectives, satisfaction with teaching and attitudes to rural practice (Appendix VII). An assessment of exposure to the Clinical Learning Objectives as described in the sixth year curriculum report was also made.

Further outcome assessment was obtained in the form of preceptor assessments and final grading exams. Results were compared between those who undertook a rural term and the remainder of the group who participated in a city-based surgical elective term. Examination of the logbooks following the completion of the eight week surgical block allowed a comparison to be made of the number of procedures assisted with or witnessed in the provincial hospitals and in the metropolitan tertiary hospitals. In an effort to determine whether the project had any long term impact in terms of rural workforce, the members of the original 1998 group were surveyed to see if their rural terms had influenced their post graduate career choices (Appendix VIII).

Day surgery exposure had been available to students prior to 1998 if they undertook their eight-week terms in surgery at The Queen Elizabeth Hospital. This had taken the form of a three week block within the overall eight week term and included structured

tutorials, a log book and a "triple–jump" examination at the end of their term. With the commencement of the new surgical curriculum structure in 1998, a day surgery attachment was available for students as a "stand alone" elective term. Minor modifications were made to the term, the most notable of which was the dropping of the "triple-jump" examination, which was replaced with a short viva exam and feedback session related to one of the student's documented log book cases. Two members of the Department of Surgery conducted this. The outcome measure examined in the day surgery group was the final exam results compared to the remainder of the student group.

RESULTS

Surgical Workforce in Rural South Australia

A total of 57 hospitals were surveyed. Forty-six of the hospitals returned the questionnaire within the original survey period, giving an initial response rate of 80%. A second series of surveys were sent to the remaining 11 hospitals and all were returned. Two health service areas grouped two of their hospitals together as a single surgical campus (Balaklava/Riverton and Berri/Barmera)

Twelve of the hospitals had no operating theatre facilities, but it must be noted that several of these "hospitals", although classified as such, were essentially medical and nursing clinics in the far outback.

Of the hospitals with operating theatre facilities, 39 were in active use. Lack of medical personnel, lack of the appropriate procedural skills and funding problems were some of the reasons given for the non-use of the theatres in the other 6 hospitals. In 34 of the 39 active operating theatre hospitals, general practitioners were involved with the administration of the general anaesthetics. Only three of the regional centres laid claim to having their own specialist resident anaesthetists. Visiting anaesthetists provided the sole anaesthetic service in five hospitals.

As outlined in table 1, the majority of the smaller hospitals reported performing less than 100 general surgical cases per year. The regional centres all reported well over 300 cases per year and where exact figures were available, most of the larger hospitals were performing in excess of 1,000 cases per year. A surprisingly large amount of general surgery was also being performed in several of the moderate-sized towns (population less than 10,000) such as Naracoorte, Wallaroo, Clare and Millicent.

Table 1. Number of general surgical operative cases per year?

Number of cases	Number of hospitals
<100	20
101 - 200	6
201 - 300	1
> 300	12

Table 2.Who performs the surgery?

Doctor category	Number
Local specialist alone	2
Visiting specialist alone	7
GP alone	6
Local and visiting	4
Visiting and GP	10
Local and GP	3
Local,visiting and GP	7

As identified by the South Australian Medical Register, there were a total of seven specialist general surgeons in country South Australia at the time of study. Two surgeons are based in each of Mount Gambier and Whyalla, with solo surgeons in Port Pirie, Port Lincoln and the Riverland. From table 2, it can be determined that the country based surgeons operated in a total of 21 hospitals. Visiting general surgeons provide a service in 28 of the country hospitals. In seven of these hospitals, the visiting surgeon provides the only elective surgical service and in 10, the visitor works in conjunction with the general practitioner to provide the surgical service. In

26 locations, the general practitioners are performing elective surgical procedures and of these, six centres exist where the general practitioner is the sole provider of surgical services. There are a further nine hospitals where the elective work is performed by either a visiting or regional surgeon, yet the surgical emergencies are handled solely by the general practitioner.

Table 3 describes the frequency of emergency general surgery performed in the rural hospitals. Of the 39 hospitals currently using the operating theatres for elective surgical procedures, five hospitals had no provision for emergency or non-elective general surgery. This usually related to the fact that the hospital was run by a solo medical practitioner. All of the regional hospitals reported frequent emergency theatre usage, while in the smaller hospitals emergency theatre occurred rarely. The majority of smaller hospitals transferred on average less than 10 general surgical cases per year to the regional centres.

Table 3.Frequency of emergency General Surgery (requiring GA)

Frequency of emergency surgery	Number of hospitals
2 or more times per week	6
weekly	3
fortnightly	8
monthly	9
rarely	8
No facility	5

The question of who performs the emergency theatre procedures is examined in table 4, and an interesting finding is that in a substantial number of facilities with emergency surgery capabilities, the procedures are performed by a GP alone.

Table 4.Who performs the emergency theatre procedures?

Doctor category	Number
Local specialist alone	2
Visiting specialist alone	1
GP alone	15
Local and GP	7
Visiting and GP	5
Local,Visiting and GP	4

Resident orthopaedic specialists were to be found in Mount Gambier (2) and Whyalla (1), while other centres relied on visiting orthopaedic surgeons. Mount Gambier also possessed a resident ophthalmologist and the SouthEast region was also fortunate to have a resident ENT surgeon. In all other instances, subspecialty services where available were provided by visiting surgeons. All of the regional centres had a comprehensive range of subspecialty services.

A Profile of Rural Surgeons

A total of 234 questionnaires were sent and 137 replies were received, a response rate of 59%. One hundred and twenty seven of the replies were from general surgeons; six were orthopaedic surgeons and one each from gynaecology, urology, ENT and ophthalmology. The overwhelming majority of the responding group was male, with only three replies from female surgeons. Eighty-eight (64%) surgeons were aged 50 or over. In terms of surgical qualifications, 115 individuals possessed the Australasian Surgical Fellowship and of these, 56 also had a fellowship from the United Kingdom. In addition, 13 respondents had other degrees such as Dip obs, MS or PhD. An UK fellowship alone was held by only 19 surgeons. Being on call either every night or every second night occurred in 59 (43%) cases and 118 (86%) surgeons indicated that they worked at least 50 hours per week.

Table 5 demonstrates the large cohort of rural surgeons in the 50-59 age group.

Table 5.Age distribution of rural surgeons

Age Group	Number
30 - 39	13
40 - 49	35
50 - 59	67
60 - 69	20
> 70	1

Ninety-one individuals had been at their current location for 10 or more years and in table7, data suggested that the majority of surgeons envisaged remaining at the current location until retirement

Table 6.Years at current location

Number of Years	Number of Surgeons
0 - 5	24
5 - 10	22
10 - 15	20
15 - 20	23
20 - 25	25
25 - 30	16
> 30	7

Table 7.Number of years envisaged remaining at the current location of surgical practice.

Years envisaged remaining in current location

0 - 5	-	-	2	3	8	10	18
5 - 10	-	1	-	7	14	18	3
10 - 15	-	1	3	9	10	5	-
>15	2	8	6	5	2	-	-
	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60	> 60

Age groups

With regard to recreation leave, 86 (63%) surgeons had taken less than four weeks leave during the past 12 months and 75(55%) responded that they had great difficulty in finding locum cover.

One hundred and twenty two (89%) respondents were married and 126 (92%) had children, with 69 (50%) surgeons still having at least one child at school. Private boarding school had been the mode of schooling for the children of 69 (50%) families. The majority of the surgeons' partners (87%) were employed with 66 surgeons responding that their partners had been able to find employment within their chosen profession. Of interest, 70 (57%) partners were in some way employed in connection with the surgical practice. A rural upbringing was present to some degree in 56 (41%) of the 137 surgeons who responded, while 27 (20%) surgeons indicated that they were originally from overseas. The most frequently nominated responses regarding the negative aspects of rural practice were the continual on-call work, peer isolation and schooling opportunities for children. The range of operative cases, lifestyle and professional autonomy was considered to be the more positive aspects of rural practice.

Rural Surgical Student Placements

A total of 125 questionnaires were distributed to the 1997 5th year class to gauge the level of support for the scheme. The questionnaires also contained an information sheet describing the proposed curriculum changes for 1998. While the student group had been aware that the course structure was being altered, many of the details had not been finalised until the end of the 1997 academic year.

Ninety-two students returned their questionnaires resulting in a response rate of 75%. Thirty-five students felt that they could not undertake a rural attachment. The reasons for not being able to undertake a rural term are described in table 8 and ranged from impending pregnancy and part-time employment to religious issues and sadly, a fear of racism.

Table 8.Reasons for being unable to undertake a country surgical attachment

Reasons	Number of students
Part-time employment	13
Family reasons	13
Religious issues	4
Inconvenience	2
Pregnancy	2
Fear of racism	1

Fifty-seven students were prepared to go to the country if required. Of these 57 students, 39 ranked the country surgical terms in their top half of preferences for the four-week surgical option term. From this data it can be surmised that at least 39 students out of the 92 respondents were interested in going to the country, with a further 18 being willing to go, but only if their preferred options were unavailable. Thirty-three of those willing to undertake a rural term were male and 24 were female. The overall class ratio of males to females was 69 to 56.

Rural Surgical term final examination results

Following consideration of the completed questionnaires, a total of 43 students were allocated to the rural surgical attachment program in 1998. The graduating class size of the sixth year group in 1998 was 118 students, from a commencement size of 123. Four students withdrew before the completion of the year and one student was completing sixth year over a two-year period and for the purposes of this study these students were not included.

Table 9 demonstrates that in terms of final examination results, there were no statistically significant differences in either the final surgical mark or the final overall 6^{th} year mark (which in turn determines intern rankings) between the student group who participated in the rural surgical terms and the group that completed the entire 8 week block within the metropolitan tertiary hospital system.

Table 9.Numerical Result Comparison – Final Exams

	Clinical competency	Surgical	Overall
City-based terms	64.80	64.89	64.56
Rural terms	65.28	65.16	64.71
t-test P-value	0.75	0.43	0.45

(P-value considered significant if $P<0.05$)

Grading Results

The surgical terms were also assessed by the relevant consultant with the use of the standard Adelaide University medical school ward assessment form. Three grades were available, A, B or C assessing 3 categories as follows; 1. The ability to take a history and to perform the clinical examination 2. Ability to synthesise and use clinical information 3. Interpersonal and communication skills. While these grades had no direct influence on the final numerical marks obtained by the students, a C grading in any category carried certain ramifications, including counselling of the student, remedial action and if more than one C grading was obtained then a pass-fail viva following the final examinations was performed (Appendix IX).

For the mandatory four-week general surgical term there were no statistically significant differences in grades obtained by the rural SCAP group and those that chose to stay in the city for their elective terms. However a significant difference was apparent in grades obtained for the elective terms between the rural group and city group as outlined in the following table.

Table 10.Breakdown of grades between the rural and city SCAPs students

		Cat 1 (city)	Cat 2 (city)	Cat 3 (city)	Cat 1 (elec)	Cat 2 (elec)	Cat 3 (elec)
City SCAPS	A	55	49	57	65	59	62
	B	16	21	15	7	13	10
	C	1	2	0	0	0.0	0.0
Rural SCAPS	A	36	31	38	26	25	24
	B	7	12	5	17	18	19
	C	0	0	0	0	0	0
Chi-squared P value					<0.001	0.01	<0.001

(P-value significant if P< 0.05)

Categories 1,2,3 refer to the clinical categories assessed on the ward form (Appendix IV). "City" refers to the mandatory four-week general surgical term and "Elective" refers to the four week SCAP option. A total of 72 students undertook a city based SCAP, while 43 students chose a rural SCAP. Three results were not available. The results indicate that when the grading results of the rural group are compared to the remainder of the class, it was significantly more difficult to gain an A grading during the rural attachment compared to a city-based SCAP attachment. (60.5% of the rural group versus 88.9% 0f the city group)

Logbook Analysis

Each rural attachment student was provided with a logbook and asked to record both city and country attachment experiences for comparison and the information is summarised in table 11. Twenty students recorded both rural and city attachment operative case numbers, while a further nine students recorded the rural term operative case numbers only. Examination of the logbooks reveals a range of number of operative cases during the rural term from 16 to 99 with an average of 59 procedures either observed or assisted with over the four-week period. This equates to an approximate average of 15 cases per week. In those logbooks correctly completed, the number of operative cases seen in the metropolitan teaching hospital environment over a corresponding time frame was between 4 to 25 cases, with an average of 11 cases over the city-based general surgical term. From these results, the student undertaking their city term was on average seeing 3 cases per week in theatre compared to the country term average of 15 cases. When subjected to statistical analysis (student t-test), the difference in student involvement with operative cases between the city and rural terms was highly significant.

Table 11. Comparison of cases between rural and city terms

	city	rural	
No. of logbooks	20	29	
Avg.no. of cases	11.1	58.9	
Standard dev.	5.2	23.4	

(Student t-test p-value < 0.0001)

The procedures undertaken by the students, as listed in the following table, differ greatly between the city and country attachments. The emphasis on skills other than blood taking and intravenous line insertion appears to be greater in the rural environment. Students also have ample opportunity to solidify their anaesthetic skills.

Table 12.Procedures performed (Rural attachment)

Dressing changes	Ring block	Plaster removal
Suturing	Laryngeal mask insertion	Endotracheal intubation
IV cannulation	Urinary catheterisation	ABG
NG tube insertion	Wound stapling	Reduction dislocated hip
Venepuncture	Carpal tunnel release	Excision of lesions
BSL	Circumcision	Perineal block
Urinalysis	Spinal anaesthesia	
Plaster application	Arterial line insertion	

Procedures performed (City attachment)

IV cannulation	Ring block
Venepuncture	Suturing
NG tube insertion	ECG
Urinary catheterisation	
ABG	

Clinical Education Development Unit Report

Of the 43 students who completed the rural surgical attachments in 1998, 29 completed the CEDU evaluation. The questionnaire was comprised of several sections (Appendix VII). Questions regarding the clinical experiences obtained, the variety and usefulness of these experiences, the practical experiences, reinforcement of clinical objectives and satisfaction with teaching were asked, using predominantly Likert-type scale assessment. The students were then asked to record whether they had performed or observed any of the Clinical Learning Objectives listed in their sixth year

curriculum handout and finally a section devoted to the "rural experience" allowed the students to document the advantages and disadvantages of the attachment.

The broad range of surgical conditions seen in the rural locations was evident by 80% of students rating the variety of conditions seen as at least 7/10. Seventy five percent of students rated the usefulness of the clinical experiences gained at least 8/10. The recorded logbook experiences matched the evaluation survey's finding that close to 80% of students rated the surgical experience gained at 7/10 or more. In terms of reinforcing the course objectives (a copy of which was printed in each logbook and made available to each surgeon), two-thirds of students gave a rating of at least 7/10. While little formal teaching was provided, students were satisfied with the continuous interaction on ward rounds and in theatre, with 80% rating the level of supervision and teaching at least 7/10.

The following skills were performed or observed by at least 75% of the students while on their rural placement – IV access, rectal examination and proctoscopy, endotracheal intubation and suction, bladder catheterisation, preparing the skin for surgery, tying surgical knots, handling basic surgical instruments, using local anaesthetic, closing surgical wounds, sigmoidoscopy and GI endoscopy.

Most of the students enjoyed their rural attachments with 75% rating it at least 7/10. When asked how they would feel about working in a rural practice now, 25 of the 29 students felt positively about it. The following advantages and disadvantages of rural attachment were identified,

Advantages

1. More time with teachers and patients
2. More practical experience, responsibility, variety of cases
3. Understanding the rural environment
4. Less formal teaching environment
5. Feeling part of a team.

Disadvantages

1. Missing lectures, tutorials and formal teaching
2. Missing family and social activities
3. Travelling
4. Financial costs

The advantages and disadvantages identified by the CEDU evaluation are also echoed in the comment section of many of the student's logbooks. An example of a logbook statement is as follows, " Overall, I think I learned more about practical health care and particularly surgery in four weeks than I would learn in a year in Adelaide ". The final recommendations of the CEDU evaluation report were as follows,

1. Student responses to the question "Did you act as an intern?" suggest the need to clarify the role of students while on their placements.
2. Consider developing structured objectives for students and teachers on placements
3. Consider introducing strategies for keeping students up-to-date with lectures and tutorials, particularly on placements close to examinations.
4. Consider linking the surgical with a medical attachment.

Day Surgery Attachment

In 1998, a total of 23 students undertook the day surgery elective (SCAP) option.. Final examination assessments were collated for three categories for each student. These were the final exam mark, the clinical proficiency result and the overall sixth year result. As demonstrated in table 13, compared to the group of students who remained in the city for their SCAPs and the group, who completed their SCAP in a provincial centre, no statistically significant differences in any of the three categories were noted.

Table 13.Comparison of examination results – day surgery, rural surgery, city-based SCAPs

Student groups	Clinical Competency	Surgical	Overall result
Day surgery	64.91	65.00	64.37
Rural surgery	65.28	65.16	64.71
City-based SCAPs	65.21	64.83	64.65

(no significant P-values (where $P<0.05$) were obtained between any of the groups)

There were statistical differences in the grades obtained by the day surgery students when compared to the grades obtained by the group of students who remained in city hospitals to complete their four week surgical SCAP option. Significant differences in the subjective grading assessment were seen compared to the group of students who completed a rural surgical term as their SCAP, where it was found that it was more difficult to gain the highest grade compared to their day surgery counterparts as described in the following table

Table 14.Comparison of subjective gradings between the day surgery, rural surgery and non-day surgery student SCAP groups.

Grades	Day-surgery (n=23)	Rural-surgery (n=43)	City-based SCAPS (n=49)	t-test Day v Rural	t-test Day v City
Clin cat 1 A grade	23	26	42		
Clin cat 1 B grade	0	17	7		
				P=0.0005	P=0.0564
Clin cat 2 A grade	23	25	36		
Clin cat 2 B grade	0	18	13		
				P=0.0003	P=0.0064
Clin cat 3 A grade	23	24	39		
Clin cat 3 B grade	0	19	10		
				P=0.0002	P=0.0196

(P value is significant if < 0.05. A total of 52 students undertook a city-based SCAP, excluding day surgery. The results for 3 students were not recorded. No student received a C grading for any surgical SCAP term)

From the information obtained in table 14, it would appear that all day surgery students were uniformly awarded the highest grades.

A total of 20 logbooks were returned by the students and on inspection, a wide variety of cases were seen by the group ranging from plastic surgery to ophthalmology with an average of 15 cases per student seen per term.

Graduate follow-up results

Questionnaires were sent to the individuals who had participated in the pilot project in 1998. These graduates are now in their third year of employment following the completion of the undergraduate course in 1998 and many, it can be assumed, would have already chosen a definite post-graduate direction and be involved in a training program of some description. Of the original 43 students, nine were international students who returned to their home countries on completion of the medical degree. Thirty-four students were identified as being potential "follow-ups" for the survey. Home addresses were identified using the local medical board register of medical practitioners and also the year 2000 edition of the Medical Directory of Australia.

A questionnaire was developed using a 10 point Likert-type scale and asked some of the same questions posed in the CEDU evaluation of the project in 1998 (AppendixVIII). These included rating the overall educational experience, operative exposure, teaching supervision and enjoyment of the rural terms compared to the city surgical terms.

Additional questions included asking whether the graduate was in a training program, how they would feel about working in a rural location now, whether the attachment

had any influence on their post-graduate careers and if they would ever consider returning to the location of their rural attachment to practise medicine.

Following the initial mailing out of the survey, it became apparent that several of the graduates no longer resided at the addresses listed in the medical register and despite various attempts to locate them, their whereabouts, presumably overseas, remain unknown. Five graduates belonged to this group and following a second mailing out of the survey form, a final response from 22 graduates was obtained. This represents 52% (22/43) of the original group who participated in the rural surgical terms, but put into context of those individuals who were "contactable", the percentage is somewhat higher at 76% (22/29). The chosen post-graduate careers for the survey respondents are described in the following table.

Table 15, Post-graduate career choices

General practitioner training (including rural GP)	8
Physician training	4
Surgical training	3
General RMO year	2
Psychiatry	2
Anaesthetics	1
Tissue pathology	1
Paediatrics	1

In response to the question asking for a rating from 1 to 10 regarding the usefulness of the clinical experiences gained in the rural attachment compared to the city

attachment, over 90% (20/22) rated the clinical experience at 7 or higher. Similar rating results of 7/10 or higher were obtained relating to the practical experience of surgery (19/22) while the survey group did not rate the experience of other practical procedures during the attachments as high (15/22). Eighteen or 81% of the 22 respondents rated the terms' enjoyment factor at least 7/10, a very similar result to the 1998 CEDU study with 75% of the students who completed the survey at that time rating the terms at 7/10 or higher. (At this point it must be emphasised that no direct statistical comparisons with the CEDU study can be made as it was a confidential study with the names of those who participated not available to the Department of Surgery.) Educational experience and levels of supervision were rated higher (6/10 or greater) in the rural attachments compared to the city attachments by 91% (20/22) and 86% (19/22) of the survey group, with teacher quality receiving similar results (19/22). Of those graduates who returned the survey, 8 had lived in a rural area at some stage.

In response to the question of how they would feel about working in a rural location now, with 1 being not at all likely and 10 being extremely likely, 15 (or 70%) of the 22 respondents gave a rating of 6/10 or higher indicating that at this stage of their careers they were more likely than not to work in a rural location. Twelve of the graduates felt that the attachment exerted influence on their subsequent career choice with a rating of 6/10 or greater, while the same number felt that a return to the location of their rural attachment for future practice location was possible with a rating of 6/10 or more.

When the group who chose general practice as a career are analysed separately, a mean score of 8.4 is obtained for the question of future rural practice and when compared to the remainder of the survey group this result is significant with a t-test p value of 0.0008. A similarly significant difference was noted with respect to the question of influence that the rotation exerted over their subsequent post-graduate career choice. The GP group had a mean score of 6.5 for this question and when subjected to a t-test, the p-value obtained was 0.007. Although the number of surgical trainees in the survey group was small (n=3), it was interesting that the only statistically significant difference between the surgical group and the remainder of the survey group was noted in the question of influence of rotation on post-graduate career, with a p-value of 0.01.

Table 16 summarises the responses of the graduates who completed the follow-up survey.

Table 16. Graduate follow-up survey results

Categories

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
GP rural	9	9	9	10	10	10	6	yes	8	9	6
GP rural	7	4	2	9	10	7	6	yes	9	3	3
GP rural	7	7	8	8	8	7	10	yes	10	9	8
GP rural	8	4	3	8	10	8	6	yes	10	4	3
GP	9	8	4	9	6	7	5	no	8	7	8
GP	8	8	9	6	6	6	6	yes	6	4	6
GP	7	8	9	7	6	6	6	yes	6	6	5
GP	9	9	9	10	8	8	7	no	10	10	6
Physician	9	8	8	9	9	9	9	no	1	6	3
Physician	2	1	7	4	1	2	1	no	3	1	1
Physician	7	8	3	7	4	7	8	no	7	5	7
Physician	7	7	8	8	6	7	6	no	6	1	1
Surgeon	9	9	9	10	9	8	9	no	8	8	10
Surgeon	10	10	3	7	7	7	7	no	3	7	3
Surgeon	9	7	5	10	9	8	9	no	8	6	7
Psych	9	9	6	10	9	9	9	no	3	3	8
Psych	5	7	9	4	2	3	3	yes	3	1	1
RMO	9	10	9	9	9	10	9	no	8	6	7
RMO	9	6	7	10	9	7	8	no	7	5	7
Paediatric	7	8	7	6	7	7	7	no	4	1	2
Pathology	9	8	8	9	9	9	8	no	3	3	3
Anaesth	8	9	9	9	9	8	8	yes	7	6	7

(GP refers to general practice, Psych refers to psychiatry, RMO denotes resident medical officer, Anaesth refers to anaesthetics. For a full description of the questions 1 to 12, refer to appendix VIII)

DISCUSSION

Surgical Workforce in Rural South Australia

There is a medical workforce shortage in rural Australia (AMWAC 1996). This applies to specialist surgical services in addition to the well-publicised lack of general practitioners (Baume 1995,Gadiel et al 1994). Determining what constitutes an acceptable surgeon to patient ratio results often in a somewhat arbitrary figure. The use of doctor to patient population ratios has been questioned as an adequate method of determining workforce needs given the hidden variations that may occur within either the medical practitioner or patient populations (Kolars 2001). For example, a simple ratio may fail to take into account that a significant number of doctors are not working to a full time capacity. Other methods have been used to ascertain workforce needs (Roos et al 1996). By analysing the number of patients currently leaving an area to undergo surgery, the number of extra surgeons required to account for the "leakage"of patients from the region can be determined. Another method is to examine the local population's age structure and health status and build a direct population needs basis to determine medium and long term workforce issues.

A 1988 study into surgical manpower suggested a Victorian ratio of approximately 1:12,000 at that time (Nelson, 1990). An earlier report into Australia's medical workforce determined the ideal ratio to be in the order of 1:11,000 (Doherty et al 1988). More recent literature inspired by the Baume report (Baume 1994) stated that in 1995, Australia had a surgeon to patient ratio of 1:6,000 (Hugh et al 1995). Whichever figure one chooses, the ratio in rural South Australia is larger in comparison. For general surgeons resident in country South Australia and registered as Fellows of the Royal Australasian College of Surgeons (South Australian Government Gazette 1996), an approximate ratio of 1:42,000 is obtained. Taken by local council boundaries, the following surgeon to population ratio figures are

produced – Eyre 1:32,000, Whyalla 1:12,000, Pirie 1:26,500, Riverland 1:34,000 and Lower SouthEast 1:21,000. This leaves extensive regions such as the Murray Mallee (32,000), Upper SouthEast (18,000), Flinders Ranges (21,000) and Yorke and Lower North (44,000) without resident specialist general surgeons. At this point, one must add that in several of these regions, experienced GP surgeons are carrying a considerable burden. It is interesting to compare these figures with a study in the USA looking at rural general surgery, which examined a population group of 51,000 in Wisconsin, where there were no fewer than seven general surgeons (Landercasper et al 1997).

The lack of representation of resident subspecialty surgeons in rural South Australia is striking. As outlined in a report to the RACS, the Riverland region warrants a resident orthopaedic surgeon and the concept of a resident regional subspecialist surgeon in other fields requires consideration (Nettlefold 1997). Certainly the current resident rural orthopaedic ratio of 1:100,000 is more than the Australian Orthopaedic Association recommendation of 1:25,000. (Licina et al 1993) Visiting surgeons can be seen to be providing services in a large proportion of the country hospitals, which seems at odds with the RACS policy on itinerant surgery. This policy states that, "council disapproves of practice arrangements whereby a surgeon regularly performs operations in urban as well as distant centres and is not readily available for the responsibilities of subsequent care management". At several of the major regional centres it was not uncommon for visiting surgeons to remain overnight or indeed for several days at a time, but are these exceptions?

The issue of smaller hospitals retaining an active operating theatre is contentious and given the relatively low number of procedures performed in most of these hospitals it would be logical to call for all country surgery to be done in regional hospitals only.

However, such a simplistic and seemingly logical fiscal approach would have dire consequences. As outlined in the 1983 Sax report into the state of South Australian Hospitals, the country hospital is an important focus for a community and in our current climate remains one of the few enduring country institutions (Sax 1983). By placing a blanket ban on performing surgery in these locations, the local doctor would be unable to utilise their surgical and anaesthetic skills and suddenly, one of the major incentives for entering rural practice, namely being able to perform procedural tasks, is no longer present (Davies 1991,Dickinson 1995). Is the local doctor then likely to remain in the country town? Will theatre nursing staff, so difficult to attract to a country location, continue to work in a hospital without theatre facilities? It was ironic to discover that in several locations, the visiting surgeons performed the elective surgical work, yet the emergency cases were handled by the local general practitioner. Another problem perhaps more applicable to the smaller hospitals dependent mostly on the GP for surgical services, is the aging of the procedural GP population. A 1995 study of NSW rural general practitioners demonstrated that the majority of surgery performed by GP's was by those in the 40-54 year age group, with a negligible amount of surgery being performed by those under 40 (Dickinson et al 1995). It has also been estimated that by 1998, 20% of rural GP's will be over the age of 60 (Davies 1991). The experienced GP simply is not being replaced and exactly what the future of medical services in several of the locations surveyed will be is unclear. The seeming reluctance of young local graduates to venture to the country towns is also a major problem. The increasing number of female graduates from Australian Medical schools also has implications for a rural workforce that currently comprises predominantly of males (Wilkinson 1999), although evidence suggests that the proportion of women rural doctors is increasing (Strasser et al 1999). United States

research regarding factors that predict a future rural career suggest that gender has a significant influence on the likelihood of rural practice. The medical school from the Thomas Jefferson University in Philadelphia concluded that males were 1.8 times more likely to enter rural practice than females (Rabinowitz et al 2001).

A comprehensive study into the provision of medical services in rural and remote Australia estimated an immediate shortfall of 28 GPs in the rural regions of South Australia (AMWAC 1996). Increasingly, overseas-trained doctors are filling vacant country GP positions, which have failed to attract local or interstate graduates.

The bigger question remains however as to exactly who is responsible for the provision of surgical services in the country area? Is it the responsibility of the individual community, struggling as it is to attract medical practitioners let alone an experienced specialist? Does the responsibility rest in part with the Royal Australasian College of General Practitioners? For many years, the RACGP have been pushing for more of their trainees to undertake surgical terms in the metropolitan hospitals (Shepherd 1995, Kamien et al 1990, Craig et al 1993). A dedicated post for rural GP's to undertake a year of general surgery exists at Modbury Hospital in Adelaide. One of the questions that arise from these rotations is how long does it take for proficiency in surgical skills to occur? Can this be achieved after only one year and in which procedures will the country practitioner be proficient? In stark contrast to the surgical training opportunities for GP's in South Australia, the anaesthetic GP training positions appear to be of great benefit and in effect are paying dividends as evidenced by the large numbers of GP's administering general anaesthesia in country hospitals.

Is the RACS then the sole provider of rural general surgery? If their edict is that only a Fellow of the RACS should perform rural general surgery, then much work needs to be done, especially in light of the fact that a major review into specialist services in

rural areas has recommended that resident service delivery should support a "critical mass" of at least two surgeons within the same discipline (Gadiel and Ridoutt 1994). It is College policy to encourage "appropriately trained surgeons to settle in country centres which provide adequate facilities for surgery".

The percentage of the Australian population that lives outside of the metropolitan area has been estimated at 29.6% and of this group, over 75% of the rural population reside in towns of less than 10,000 (NRHA 2001). The percentage of general surgeons in rural South Australia compared with the number registered within the entire state is 5.8%. This compares with the 1996 AMWAC finding of a nationwide figure of rural surgeons as representing 23.3% of the total general surgical workforce in Australia (AMWAC 1996). This government advisory group recommended that to account for projected requirements, an additional 40 general surgery advanced training positions would be required, ideally commencing in 1996 in an incremental fashion over a 4 year period. The proportion of full-time employed specialist general surgeons who practised in rural areas of Australia in 1992/93 was estimated at 18.9% of the total general surgical workforce (Gadiel and Ridoutt 1994). Despite the seemingly high percentages determined by these Government reports, it was identified that between the states and territories significant maldistribution did occur and that supply trends will be dominated by the large group of surgeons (38.7%) aged 55 and over contemplating retirement in the near future. (AMWAC 1996) It is hardly surprising that there is a local and impending national rural surgical workforce shortage when the results of the rural surgeon profile study are examined.

Rural Surgeon Profile

The profile developed from the responding surgeons is of a predominantly male, middle-aged, married and hard working group. The population group under examination in this study had a mean age value of 52 years and without adequate input into the junior ranks, the average age of rural surgeons will increase proportionally over the next few years. The Australian Institute of Health and Welfare has data from its 1994 medical workforce survey which shows an average age for all specialists of 48.8 years, some 3 years younger than our study group of rural surgeons (AMWAC 1996).

Frequent on-call work was identified as a major negative aspect of rural surgical practice and indeed this is often cited as a major disincentive to rural general practice, both here in Australia (Wise et al 1994) and overseas (Fortier et al 1995). The whole issue of number of hours worked by junior hospital doctors has been highlighted in recent times and it is not unreasonable to suggest that in time, the number of hours worked by senior medical practitioners will also come under the microscope of "safe work practices" (Light 2001). If legislation is ever passed to limit the number of hours worked by specialists there will be far reaching consequences for single and two-surgeon towns. From the rural surgeon profile study, it was apparent that the larger Eastern states provincial centres were able to provide more ideal on-call arrangements and organise surgical cover for colleagues on leave. Finding surgical locum cover was described as being difficult by the majority of surgeons and this "difficulty" is reflected by the large number of respondents taking less than 4 weeks recreation leave over a 12 month period. The problem with lack of locum cover is similar to that experienced by rural general practitioners and has long been a major cause for disenchantment and increasing drift of practitioners back into urban areas (Hamilton

et al 1997). One interesting aspect of the study was that once a surgeon has settled on a practice location, it is more than likely that they will remain there for a significant period of time. This contrasts with information available on the longevity of general practitioners in a rural location that suggests the projected length of stay in a rural practice location is decreasing (Strasser et al 1999). The problem of rural practitioner retention has also been examined in the United States and Canada, with it being acknowledged that it is more difficult to retain GP's in rural areas than it was to attract them there (CMA 1997).

The RACS has recognised the difficulty that non-metropolitan surgeons have in attempting to find locum cover and have established the rural locum scheme in an attempt to resolve these problems.

The issue of peer isolation has been raised in previous studies and continues to be a major concern for rural surgeons (Faris 1997, Nelson 1991). A strategy such as the RACS rural locum service has the potential to not only achieve the immediate aim of providing locum cover, it may also change long held city attitudes regarding rural medicine in general (Chesterfield-Evans 1991). The same reasons of adequate locum cover, on-call load, professional isolation, and family commitments were given by a group of paediatricians from Queensland who were surveyed as to why a specialist paediatric vacancy in a regional hospital in outback Queensland had remained unfilled (Gorton and Buettner 2001).

There are of course, factors beyond the control of any college when influencing an individual's decision to move to the country. Schooling opportunities have been identified by the survey group as a major negative aspect of rural practice and it would appear that many respondents were dissatisfied with the available local

schooling, as over 50% were sending or had sent their children to boarding schools, no doubt at significant financial and social cost.

Comment has also been made in the literature citing the importance of an understanding spouse when deciding on country practice (Adamthwaite 1997, Flux 1999). The high rate of marriage amongst the respondent group would seem to support this theory. Also of interest was the fact that a large number of the surgeons partners were in some way employed within the practice.

The answers to these problems are difficult to determine, however several initiative are being undertaken at the national and local level to address the surgical workforce problem.

Current Initiatives to resolve Workforce issues

The RACS has recently commenced an advanced training program in Rural General Surgery, with a period of time to be spent training in a rural centre (Royle 1996). The Commonwealth Government funds these training posts and the objectives are to increase the exposure of advanced trainee specialists to rural practice, improve rural training infrastructure and to improve access to specialist medical services in regional and rural Australia. The Rural Surgical Training Program commenced in 1998 and completed over a 5-year period, with scope given to attain skills in surgical subspecialties in addition to those acquired during the course of the general surgical scheme. This may address to some degree the feeling that potential rural surgeons lack confidence and training in dealing with the breadth of surgery required in rural surgical practice (Faris 2000). Currently there are 42 trainees in the program and while it is still too early to determine the long term impact of the scheme, several trainees who have completed their training are now established in rural locations. One

of the successful rural surgical trainees is now practising in Mt.Gambier and since the completion of the rural workforce survey, the overall number of rural surgeons resident in country South Australia has increased from seven to a total of nine. Focus has traditionally been on the Eastern states with their large rural centres as training locations, however given the volume of work as indicated by several of the regional centres in South Australia, the establishment of training positions seems overdue. Whyalla and Mount Gambier in particular appear ideally suited for training positions, given that not only are there two surgeons in each location (College requirement), but the workload is also present to support a trainee. Whyalla participated in an advanced registrar rotation in 2000, having had non-accredited registrars undertake 6-month terms for several years. With a little creativity, other potential training positions could be formed. For example if Port Augusta and Port Pirie were combined as a surgical campus, this would fulfil current college requirements and provide a solid training workload. The Riverland region with its unique collection of several medium sized towns in close proximity to one another has recently established a 6-month rotation for general surgical registrars. As outlined in a major 1994 review of the specialist workforce, "the major strategy colleges could adopt to influence decisions of Fellows to practice in rural areas would be to expose trainees to quality rural practice experiences" (Gadiel and Ridoutt 1994).

The Department of Surgery at the University of Adelaide has been developing several strategies to support current rural surgeons and foster an increased commitment to the future of rural general surgery. Twenty-four hour, 7 days a week cover is provided at Port Augusta, which remains without a resident general surgeon. Port Augusta is a major regional centre with a population of 15,000 and a further 6,000 residents in the surrounding district. Surgeons from the Department of Surgery at the University of

Adelaide are rotated on a weekly basis to cover the surgical needs of the town. This has numerous benefits, the most obvious being that Port Augusta has specialist surgical cover. The other benefit is that surgeons from the city are exposed at regular intervals to the challenges of rural surgery (Themes 1992). This is a step towards changing the attitude with which teaching hospitals often view the rural institutions, an attitude, which often riles those working in the country region (Rainer 2000).

Another current example of rural surgical services provided by a University Department is the visiting surgical service established by the University Department of Surgery at Queen Elizabeth II Medical Centre in Perth (Kierath et al 1998). Smaller rural communities in Western Australia were served by a group of surgeons who undertook regular visits and operating sessions in the rural locations. A specialist surgical outreach service has also been specifically designed for improving access to specialist care for remote Aboriginal communities in the Northern Territory (Gruen et al 2001).

A second initiative is the establishment of a locum specialist service. Therefore, if rural general surgeons require leave, a general surgical cover can be organised for them. The opportunity has also been created for the rural general surgeon to update their skills at a major metropolitan teaching hospital with locum cover provided for them. The availability of continuing surgical education programs may be fundamental in retaining rural surgeons and decreasing the professional isolation felt by rural colleagues.

A 6-month rotation for a post fellowship general surgical registrar was trialed in 1997 at Port Augusta and deemed successful by all the parties involved (Anthony 1997). Given ongoing funding, this rotation may prove to be an ideal way in which to

introduce the potential rural surgeon to the realities of country practice, yet at the same time retain a close link with a teaching hospital.

Another suggested model is to link a regional hospital post with a tertiary hospital such that if a newly qualified specialist went to a rural post for a 2 year tenure, guarantees would be given of a position at the principle teaching hospital upon their return to the city (Faris 1997, Gorton and Buettner 2001). The advantage with this model is that a percentage of surgeons may be inspired to remain for a longer term in the provincial centre and the issue of peer isolation is not significant.

The most important long-term initiative may be in the commencement of rural surgical attachments for final year medical students. It is widely acknowledged that the two most important factors in determining whether a graduate will pursue a rural career are a rural upbringing and exposure to rural medicine at an undergraduate level (ACP 1995, Kamien 1990). With over 40% of the rural surgeons responding to the profile study indicating that they had spent some of their childhood years in the country, the "rural upbringing" theory supported by other studies appears correct (Rolfe et al 1995, Fryer 1997). Several universities have introduced schemes for easier access for rural secondary school to enter the medical course (Hamilton 1998). The University of Newcastle has reduced the cut-off score required for entrance to the medical degree for applicants from rural high schools (Rolfe and Pouis, 1997). The University of Western Australia medical school also reserves several places for rural high school students whose tertiary entrance results do not exactly meet medicine entrance requirements (AMWAC 1996). The recently established rural medical school at James Cook University in Townsville has a regional mission to ensure that at least 25% of entering students have a rural background (Hays and Bower 2001). As a separate University of Adelaide department within the Faculty of Medicine, the

Department of Surgery has no control or influence over who is accepted into the medical course and focus must instead be placed on developing rural attachments.

Student Attitudes towards Rural Terms

One of the important ingredients for success of any student attachment is the student group itself. With the current maelstrom of change in medical education (Sefton 1995, Hamilton 1998), it is often simple to overlook the needs of the medical students themselves, especially when change is planned (Huppatz 1996). The pleasing aspect of the response from the student survey was that despite only a brief explanation of the rural concept, as described in the questionnaire information sheet, 60% of students who responded were prepared to venture to the country and two-thirds of this group were actively interested in the attachment. This would indicate that there is a substantial core of the medical student group willing to undertake a rural surgical term. A factor in the interest in the rural term may also be related to the well-established Adelaide University Rural Medical Students club, which provides a forum and activities for undergraduate medical and allied health students. Most Australian medical schools have rural clubs for interested undergraduates and they also have the opportunity to participate in an annual national Rural Health Curriculum Conference. Student interest in community based terms has also been documented in overseas studies. An English medical student study conducted in London examining student responses to the new General Medical Council curriculum recommendations, discovered that 50.2% of medical students supported the increase in community based education (Rosenthal and Ogden 1998).

Another major point to be drawn from the study is that consideration for a student's financial position is required, given the need for students to contribute to the Higher Education Contribution Scheme (HECS). Many students have part-time jobs and simply can not go to the country for a 4-week period and still expect to retain their jobs.

The student demographic mix also needs to be taken into account when formulating a rural program, given the current cultural diversity seen in Australian Medical schools (AMWAC 1996, Klimidis et al 1997). An example of just how diverse the student population can be is reflected by a study examining the need to teach colloquial Australian English to medical students from non-English backgrounds (Chur-Hansen and Barret 1996). These researchers found that 41% of students enrolled in the first year of the undergraduate medical course at the University of Adelaide in 1995 recorded a language other than English as their first language. Many of the "family reasons" recorded in the survey forms were related to the fact that the medical students were the pivotal English speaking member within the family unit and as such felt that they were unable to leave their families for 4 weeks.

The responses from the students who completed the CEDU evaluation study confirmed that there is a significant positive attitude towards rural surgical terms. When asked how enjoyable the terms were, the students all rated it at least 5/10, with more than 75% rating it at least 7/10. Seven students rated the experience at 10/10. Similar results were obtained in a Victorian study examining the attitudes of third year medical students undertaking voluntary rural general practice placements (Peach and Bath 2000). It is also interesting to note that many of the graduates surveyed regarding the 1998 pilot terms remained positive towards the concept of rural medicine as a career and remember their rural surgical terms as being highly enjoyable.

Teacher-Student Interaction

The teaching environment is unique within the country hospital. For the first time in many cases, the student has an unadulterated access to the teaching potential of the consultant surgeon, as there is no significant resident staff "barrier" in any South Australian country hospital. The usual hierarchal ladder found in the metropolitan system can consist of a senior registrar, a junior registrar, resident medical officers, interns and other students. This hierarchy has the capacity to obstruct the medical student from gaining access to adequate clinical teaching and experience. The salient point that is evident in the rural attachments is that a consultant surgeon is performing the teaching, in whichever form. Assumption is often made within the metropolitan teaching hospital system that because a student is attached to a specialist unit, teaching will primarily come from the relevant specialist. While no direct assessment of the urban surgical attachments was made, many studies have shown that junior medical staff members within the tertiary hospital are a major source of student teaching (Holden 1984, Schwartz et al 1992). In a study of 880 medical students from the Netherlands, it was concluded that the junior doctors were the most important teachers during clinical clerkships (Remmen 2000). Interns and residents have a traditional role in the teaching of procedural skills. This is not to criticise the role of the hierarchal ladder in the teaching of medical students, but rather to illustrate the fact that during the rural attachments, the students are taught by consultant surgeons of many years' experience in an "uncluttered" environment. One of the major advantages of the rural attachments identified by the students was the feeling of being part of a team, and significantly, a team that was friendly and approachable. The establishment of a positive learning environment is one of the fundamental criteria for adult learning philosophy. A good relationship between medical students and

surgeons is conducive to a positive learning experience (Sloan et al 1996). This same study discovered that other positive discriminators for good teachers were the degree to which communication was encouraged, the degree to which the preceptor appeared to enjoy teaching and the degree to which the preceptor facilitated the learning of surgical fundamentals. Feedback gained from the students via the CEDU study and logbooks would indicate that the country surgeons scored highly on the "positive preceptor" scale. Research has also shown that students 'choice of post-graduate career is related to exposure to clinical role models during medical school (Wright et al 1997). Specific research examining what influences medical students' choice of surgical careers, determined that those students considering a career in surgery were more likely than their counterparts to be motivated by role models (Erzurum et al 2000). By being friendly and approachable, the rural surgical team, has not only succeeded in providing a positive role model, but has eliminated one of the students' primary anxieties, namely interacting with senior staff (Moss and McManus 1992).

Procedural Skills

Examination of the rural surgical students' logbooks would clearly suggest that in comparison to their city attachments, a far greater range of general surgery was experienced in the rural attachments. Once again, adult learning principles were being applied in the form of increased experiential learning. The value of a logbook for undergraduates can not be underestimated as studies have shown that logbooks or checklists result in an increase in the acquisition of practical skills and allows the student to utilise their time more efficiently (Hunskaar and Seim 1984). Even though most medical graduates will not be surgeons, all graduates must learn to recognise

surgical disease at the primary care level (Schwartz et al 1992) and for this reason it is apparent that the broad based rural terms can provide exactly the type of surgical foundation which may be more appropriate for the undifferentiated practitioner.

In addition to the increased access to surgical cases, the project has also demonstrated that the students are performing a more varied and greater amount of procedures in the country hospital placements. The question of how competent interns are at various procedures is often asked and for medical students the carrying out of simple practical procedures remains one of the most anxiety provoking activities during their undergraduate years (Moss and Mcmanus 1992). Despite most medical schools providing students with a list of procedures with which they are expected to be competent with by the completion of their final year, little monitoring of whether these ideals are achieved takes place (Collins et al 1994). Graduates often feel that proficiency in simple surgical procedures and skills is not adequately obtained during the undergraduate course (Prideaux and Marshall 1994). This was confirmed by a Victorian study to assess the experience in clinical procedures of new interns which determined that undergraduate training in procedural skills in Victoria is inadequate (Taylor 1997). Another study of rural general practitioners in the Hunter Valley region of NSW concluded that more than a third of doctors were not confident in various facets of their emergency skills (Tolhurst et al 1999). The potential of undergraduate rural placements to contribute to the teaching and application of procedural skills is evident by the results of the project thus far. Several studies have concluded that rurally based attachments can provide an environment in which students gain competency in procedural skills (Cuthane et al 1993, Harth et al 1998). Students at Flinders University who had participated in the initial PRCC project were

noted by their subsequent hospital based teachers to be superior in terms of procedural skills when compared to their peers who had completed 5th year within the tertiary hospital system (Worley et al 2000).

Despite the fact that the rural surgical students experienced an overwhelmingly greater exposure to operative cases and procedural skills when compared to the experience gained during their city general surgical clerkships, it is salient to note that in terms of final examination results, the increased depth of experience gained in the rural term did not translate into any statistically significant increase in examination results. This is similar to results obtained in a Canadian study performed at the University of Alberta that found despite a marked variation in clinical experience in multiple surgical clerkship sites, post rotation scores were similar (Chatenay et al 1996).

The student log-books were not "assessed" as such, however, they did provide an effective insight into the surgical experience gained by the rural students and perhaps given that the log-books also contained the core objectives expected of them, the books may have allowed the students to direct their clinical learning more fruitfully. It was an interesting observation that many students, who were not undertaking a rural attachment for their SCAPs component, made enquiries as to the availability of the logbook. Other forms of the log-book principle include portfolios and reflective journals, which expand on simple lists and tasks completed by including themes such as personal learning objectives and records of feedback (Hamdorf and Hall 2001). The drawbacks with these more personal-style diaries are the issues of confidentiality and how they are assessed (Wetherell and Mullins 1996).

The rural students' logbooks also highlighted the dearth of clinical experience within the metropolitan tertiary hospitals. Reasons for the decrease in clinical teaching

experiences have been documented previously and strenuous efforts are underway to find alternative teaching opportunities for undergraduates. Logbooks allow examination of student activities to take place and a policy of logbooks for all surgical students, as a method of directed learning and feedback mechanism, would have merit. Recent work from the United States used pocket-sized computers for the medical students to document their clinical experiences (Rattner et al 2001). The study determined that the computer "logbooks" facilitated the documentation of the students' clinical experiences and that the data could then be used by faculty to assess the nature of students' clinical education.

Clinical skills laboratories within the metropolitan hospitals are now also an integral part of the undergraduate curriculum and may facilitate the acquisition of procedural skills. A prime example of a facility purpose built to develop and enhance the procedural skills of both undergraduates and postgraduates is the Collaborative Training Centre for Surgical and Medical Skills and the Centre for Advanced Surgical Training at the University of Western Australia (Salfinger 2001).

Teachers

While medical education is heading down the path of student directed learning in the form of Problem-Based Learning (PBL), the teacher is still required to facilitate learning (Ramalingaswami, 1989). The traditional medical school has long regarded the acquisition of a Fellowship and seniority as being the benchmarks of a good teacher, but in reality, academic knowledge has little bearing in the profile of an effective educator (Sloan et al 1996). Little emphasis has been given to the education of the surgical educators in the past, but recent measures have been undertaken to

address this issue. The RACS has followed the lead of the overseas' colleges and commenced courses and workshops for aspiring teachers. Any evaluation of the surgical curriculum also requires feedback from the students and the teachers themselves. The CEDU study into the rural surgical attachment represents a major student driven evaluation of the surgical term and feedback in all areas regarding the learning environment was positive. One of the major stumbling blocks against the long-term acceptance of community based medical education is to persuade long-term faculty leaders that academic programs in the community do not lead to a decrease in the quality of learning teaching, service and research (Bruce 1996). While in recent years medical school attitudes have been changing in favour towards community based education, examples abound where senior academic clinicians believed that teaching could only occur in a teaching hospital. In a major 1985 report about Australian teaching hospitals, a surgical department head remarked that, " one will come to the realisation that a hospital of about 750 beds is of minimal size to provide effective teaching units" (Tracey 1985).

However, before any critical analysis of teaching by community based teachers occurs, an objective assessment of teaching within the traditional base of medical education, the tertiary teaching hospital, should take place. It is in this academic enclave where any change may be resisted as teachers often have inflated views of their own teaching ability and display ambivalence towards formal teacher training (Finnucaine 1995). Teaching appears to have run a poor second to more highly valued activities such as research and publications and this coupled with the increasing economic efficiency drive has resulted in senior clinical staff being less involved with student education. The quest for publications and research is not limited to the medical fraternity according to a recent editorial in the education section of The

Australian (14/11/01). A survey of university academics was performed asking what factors were taken into account for promotion and revealed that 85% of those questioned remarked that the quantity of research and publication was the most important factor. The quality of undergraduate learning was deemed to important by only 22% of surveyed academics.

The question of whether the resident staff should also be given teacher-training warrants thought given the important role that they play within the metropolitan teaching hospital. Overseas work into this area has shown that resident teaching programs can be of benefit (Dunnington and DeRosa 1998). The entire question of current teaching standards demands scrutiny when the results of the 2000 edition of The Australian Good Universities Guides are taken into consideration. Medical undergraduates from over 10 campuses gave their respective courses on average, 1 out of a possible 5 rating for teaching quality, 1 out of 5 for generic skills and a 2 out of 5 rating for overall course satisfaction (The Australian 1999).

The traditional surgical clerkship has remained the cornerstone of surgical education for senior undergraduate students, yet the quality of the surgical attachments depends on many varied activities. Even within the confines of the metropolitan teaching hospital system, clerkships can be extremely diverse, involving teachers with differing levels of enthusiasm and educational experience.

Assessment

As there is diversity in the quality of different clerkship sites with regard to teaching, it invariably follows that there is equal diversity in the assessment given to students by their teachers. The current system for ward assessment of the final year surgical student at the University of Adelaide consists of a standardised form, which theoretically is filled out by the head of the unit, usually in consultation with other members of the surgical team. A clinical case would be presented towards the end of the attachment to the consultant team and in conjunction with the student's performance during the term assessment would be made and the appropriate grades awarded. For the rural attachments and city-based SCAPs, the standard assessment form was used, but the presentation of a "long" case was optional. It is possible that for the rural students a more accurate assessment of their ward clerkship was performed due to the increased student-teacher interaction. The finding that there were no differences in examination results between the rural groups and city groups is consistent with results obtained by previous researchers who compared surgical clerkships at sites other than the principle teaching centre (Levitsky et al 1974, Calhoun et al 1984, Seabrook et al 2000, Imperato et al 2000). The major differences between the results from the Adelaide University students and the overseas studies are the remoteness of the provincial hospital from the city tertiary hospitals, the level of surgical services provided and the relative absence of resident medical staff. Overseas focus was on the "community" or "district general" hospitals which were often located in urban or outer metropolitan areas. An article was found documenting the experience of the University of Louisville in the 1970's with their rural surgical

clerkship program (Martin et al 1981). Students at this medical school had the option of completing a 9-week surgical rotation in a rural location. The size of the town was recorded as being 20,000 inhabitants, very similar to the size of the provincial centres utilised for the University of Adelaide rural surgical terms. Significantly, this study determined that there were no significant differences in examination results between the group who completed their surgical clerkship in the country and those who completed their surgical terms in an urban hospital.

As one very early study into surgical clerkships at different sites concluded, " one might assume that the learning environment is immaterial and that learning at the clerkship level is purely self-motivated" (Levitsky et al 1974). This comment underlines the fact that in many respects, the clerkship format allows for adult learning techniques to be utilised.

The Australian studies that did compare strictly rural with city terms involved either predominantly community medicine rotations (Worley et al 2000) or specialties other than surgery (Kamien 1996). Some differences in examination results between the rural and city groups were noted in these studies, although numbers were small and no definite conclusions could be determined.

A significant difference in the number of operative experiences in the rural term compared to the metropolitan term was detected, yet this did not translate to an increase in surgical examination results compared to the group who remained in the city for their surgical elective terms. A Canadian study examining the effect of volume of clinical experience on surgical exit examinations also found that there were no differences in mean scores between students exposed to a high volume of surgical experience and those having a low volume (Chatenay et al 1996). The greater number

of procedures experienced by the rural group may impact upon them as future practitioners by increasing their confidence to manage surgical conditions and perform various clinical skills.

Another significant finding in the rural group relates to the grades obtained by them. From the collected data, it was evident that it was more difficult for the students who undertook a rural term to obtain an A grading compared to the group who remained in the city. A potential explanation for the observed difference could be rural surgeon unfamiliarity of the grading system, although for many of the city-based surgical specialty consultants who participated in the elective terms, this was also their first experience of having sixth year students on their units. Another explanation could be that the rural surgeon was a more actively involved preceptor than their city counterpart and perhaps gave the students a realistic subjective assessment. The almost uniform awarding of an A grade to students in several of the city terms highlights the problems associated with a subjective assessment form which has only 3 descriptors (Ravelli and Wolfson 1999). A United States study from the University of Iowa examined whether there was a difference in student evaluations between a team-based or traditional approach compared to a single preceptor assessment (Ephgrave et al 1997). Some similarities can be drawn with the University of Adelaide rural surgery terms where the subjective student assessments were completed by a single preceptor, as opposed to the general surgical clerkships in the tertiary hospitals where assessment was more of a team approach. In the Iowa study it was discovered that the preceptors gave a higher subjective rating for students with an increased number of students nominated for honours, but there was no correlation with students' exam performances. The higher subjective ratings obtained by the

preceptor-based students in the Iowa study is in direct contrast with the results obtained by the University of Adelaide rural surgery students.

Another conclusion to be drawn from the objective examination results is that there was no difference between the rural group who effectively undertook 8 weeks of general surgery and the city SCAP group who completed their 4 week mandatory general surgical terms and 4 weeks in a surgical subspecialty of their choice. This finding concurs with a study performed at Queen's University in Ontario, Canada that concluded effective undergraduate surgical education can be offered in many specialty settings (Poenaru et al 1998). By removing the need for clerkships to be entirely based in general surgery, educational opportunities may be more effectively spread across the entire surgical specialty spectrum.

Negative Feedback

The major point of negative feedback has been that the students feel they are academically isolated from the city lecture program. At the time of the pilot project, the final year students had a series of lectures on Wednesday afternoons at the Royal Adelaide Hospital and these were designated as "core topics" and therefore deemed examinable. In addition to these lectures, many other "unofficial" core lectures had evolved over the years and were well attended by the student group. It is imperative that students who are undertaking country attachments are not deprived access to important lectures. A more radical approach to the problem of city-based lectures and access to them would be to abolish the lectures altogether. In 1899, Sir William Osler

recommended abolishing the lecture method of instruction and placing a greater emphasis on observation and reasoning (O'Rourke 1999). The clinical environment as a medical educational resource, rather than lectures and tutorials allows for the "modern" trend for self-directed learning. While the rural surgeons provided little in terms of structured lectures, it is interesting to note that over 80% of students, who responded to the CEDU evaluation report, rated the level of supervision and teaching at least 7/10. By having a continuous interaction with the surgeons on ward rounds and in theatre, the majority of students felt that they had been provided with good learning experiences.

The negative feedback from the students did prompt a major review of the lecture program and input was sought from lecturers, immediate past students and current undergraduates. This is another example of adult learning, with its strong emphasis on feedback, being utilised. As a result of the feedback sessions, a new lecture structure was devised with increased relevancy and accessibility for all students. In essence the "negative" feedback had a positive outcome by forcing a re-examination of the old lecture system. This also served to address one of the recommendations stemming from the CEDU evaluation report.

While the rural program for 1998 essentially represented a translocation of the traditional surgical apprenticeship from the city to the country, it also allows for the development of an increased focus on the use of information technology and telemedicine.

One method of transferring information to a remote location is via the use of telemedicine technology. This allows the transfer of information in real time via specialised telephone links. There are multiple examples of telemedicine being used

to bridge the country to city gap in terms of patient diagnosis and management, both nationally and abroad (Crowe 1993, Peredmia 1995). A South Australian study in 1993 determined that in addition to remote consultation, telemedicine had a very important role to play in terms of "distant" education (Yellowlees 1993). Teaching has occurred between Aberdeen University in Scotland and the United Arab Emirates University. The experiment demonstrated that technology was adequate for easy and fully interactive teaching to take place (Norman et al 1995). At the local level, telemedicine has been utilised for the transmission of lectures, seminars and interactive tutorials from The Queen Elizabeth Hospital to the Lyell McEwin Health Service (a distance of 30 kms) for several years with success. On several occasions, three way links with Port Lincoln, Mount Gambier and Port Augusta have taken place. The new clinical school in Townsville has made extensive use of telemedicine for both undergraduate and postgraduate teaching purposes. All of the participating hospitals in the rural attachment scheme have the infrastructure for telemedicine, however the costs involved are currently prohibitive. The two main costs in funding the telemedicine links are booking the "bridges" for the telemedicine link to each location and the use of the integrated service digital network (ISDN). To allow 3 hours of lectures to be relayed to all five hospitals for an academic year would cost approximately $AUD 40,000 (1998 prices). The potential benefits of the telemedicine concept are that the students will maintain contact with their Adelaide based lectures and interaction between the city and country can take place. A potentially exciting concept is for lectures from the country to be relayed to a city lecture theatre, with for instance, a rural surgeon taking a lecture on road trauma. This could be one method to bridge the peer and academic isolation felt by the country medical fraternity. The perceived peer isolation is one of the major negative aspects of rural practice as

identified by the rural surgical group surveyed and interestingly was also identified by medical students in a Victorian study as a disadvantage of a rural placement (Peach and Bath 2000).

Computer-based teaching for medical students is gaining support as a medical education tool, especially now that the era of problem-based learning has dawned (Devitt and Palmer 1998). Greater emphasis is placed on the student to find the available information on a given topic and with the amount of material available on the Internet, never before has so much been available so readily (Carlile et al 1998). Due primarily to the lack of resident medical staff, none of the participating country hospitals have medical libraries comparable to the teaching hospital libraries. However, they all have computer facilities linked to the internet and students have made use of this tool for medical self-education. The major limiting factor in improving the computer facilities is, as has been alluded to previously, a question of finance. The rural surgical project was fortunate to gain funding from the South Australian Centre for Rural and Remote Health and it was felt that in the initial phase of establishing the project, preference should be given to the accommodation and transport needs of the students. Accommodation in the country regions was a larger than expected problem as all the hospitals, except Whyalla, were of recent construction and the great source of past student accommodation, the nurses quarters, are no longer present.

Another potential problem arising from the project is one that has baffled medical schools worldwide. How does one reward its teachers? Recognition for the significant contribution made by the rural surgeons is mandatory. Many authors have said that medical schools should review their procedures to appropriately reward their teaching staff (Finnucaine et al 1995). A study of 100 United States Medical schools found that

very few faculties rewarded their community preceptors with financial compensation and that a clinical academic title was the most common form of recognition (Fields et al 1998). Presently, honorary clinical titles have been awarded to the participating rural surgeons, however in the long-term consideration must be given to a degree of financial compensation. In a local study, 52.6% of rural GP's who participated in rural attachments for students felt the attachments had a negative effect on their income (Barritt et al 1997). Given the large number of hours and on-call duties performed by the surgeons, the addition of teaching to their already busy schedules needs to blend in with their work routine. The success in terms of student satisfaction and exam results is largely due to the enthusiasm of the rural surgeons and without them, the program will cease to exist. Faculty supporting the rural surgeon, especially with finding locum surgeons can avoid "Burn-out". Care will be needed to avoid overloading the provincial hospitals with increasing numbers of students, as this will detract from the unique learning environment which currently exists. More students will simply lead to a reproduction of the metropolitan teaching hospital situation. It remains to be seen how the establishment of local rural clinical medical schools will impact on the delicate educational eco-system. Unless the new rural schools attract additional personnel to their area, it would seem most unreasonable to flood increasing numbers of students on the resident surgeon.

Alternative Teaching Environments – Day Surgery

The addition of pressures of health economics translates to less opportunity for the students in tertiary teaching hospitals to experience common surgical conditions and their subsequent treatment and management (Tracy 1985, Prideaux et al 1994, Doyle 1985, and Larkins 1990). Increased patient turnover, the rise to prominence of day surgery units and the change in private health insurance levels have combined to change forever the patient mix available as teaching material for medical students. The concept of day surgery teaching is gaining favour and remains a largely underutilised source of medical teaching (Seabrook et al 1997). Some concerns have been raised that students in the day surgery environment will cause disruption to the efficient running of the unit. It has been found however that students do not impact upon the running of the day surgery unit and if anything, make a substantial contribution to the quality of patient care (Rudkin et al 1997). A day surgery attachment for final year medical students at the University of Adelaide has been in place for several years and proven to be popular and especially effective in exposing students to common surgical conditions no longer treated in the inpatient setting (O'Driscoll et al 1997).

In 1998, a Day Surgery Unit (DSU) attachment was available as a separate surgical elective option for the first time due to the changes in the final year surgical curriculum and proved to be a popular choice amongst the students with a total of 23 students undertaking the term. Scrutiny of the students' logbooks revealed that a wide

variety of procedures spanning a number of different surgical specialties were experienced. Each student followed an average of 15 patients from the time of arrival in the DSU until their discharge, and in most cases follow-up of the patient continued with a post-discharge telephone inquiry the following day. In essence, this method of learning incorporates the modern theme of "longitudinal" experience with the patient. Longitudinal learning implies that the student is involved with a patient at all stages of management, from initial consultation through management and eventual discharge. While the day surgery longitudinal experience may be abbreviated with respect to initial diagnosis and investigation, it is a "compacted" version of the longitudinal experience described in primary care clerkships (Peters et al 2001). An integrated, longitudinal, patient-centred approach has been developed for the Greater Murray Clinical School in Wagga Wagga, New South Wales, one of the new Rural Clinical Schools in Australia (Khadra 2001). The DSU rotation also gave the students the opportunity to practise adult learning principles, by being largely self-sufficient and applying many of the problem based learning principles learnt during the earlier undergraduate years. The preceptors of the DSU attachment, two members of the Department of Surgery, conducted an introductory session with the students outlining objectives and expectations, were involved directly with the teaching during operative lists and conducted a feedback session with the students on the final day of their attachments. In some ways, the DSU term had similarities to the rural attachments in terms of a more "direct" contact with the consultant/senior registrar and usually did not have the extended team so often present on the general surgical attachments in the tertiary hospitals. Students often remarked in the feedback sessions that the consultants were more "relaxed" and conducive to teaching when compared to the ward inpatient setting.

The range of conditions seen by the students merit comment. Varicose veins, carpal tunnel syndrome and skin lesions are precisely the types of conditions that the majority of students who become general practitioners need to be exposed to, in order to become proficient in their recognition and subsequent management. The days of these types of conditions being admitted as an inpatient on the day prior to surgery, are long gone, thereby significantly reducing the opportunities that a student, on a general surgical ward clerkship, has to witness common surgical conditions (Seabrook et al 1997). The question has been posed previously whether the traditional general surgical clerkship still holds relevance in the preparation of the student for life as an "undifferentiated" practitioner. For those students who do pursue a career in general practice, a DSU term may prove to be more clinically relevant. Previous research has documented that the students involved in a DSU attachment felt that their expertise in basic surgical skills and knowledge of common surgical procedures increased during their four-week term (O'Driscoll et al 1998). The same study also revealed an increased understanding of aseptic techniques, surgical assisting, local anaesthesia and suturing.

In terms of measurable educational outcome, the DSU attachments followed much the same trend as the rural surgical terms. There were no statistically significant differences detected in final exam results between the group who undertook a DSU term and those that remained in the city or went to the country for their elective attachments. This applied to all the final results examined: surgery, clinical proficiency and overall mark. Unlike the rural terms however, the chances of gaining an A grading were statistically higher and this may reflect a relative lack of daily contact that the day surgery preceptors had with the students compared to the rural surgeons. An evaluation study of a day surgery unit as a teaching facility in the United

Kingdom found strikingly similar results to those obtained at the DSU at The Queen Elizabeth Hospital (Seabrook et al 1998). The Britih study concluded that the day surgery attachment prepared the student as well as other courses for their end-of–year examinations.

Graduates and Future Practice Location

The rural surgical attachments have now been incorporated as a permanent feature of the final year surgical SCAP program. Buoyed by the success of the project as a whole, the University of Adelaide has proceeded to implement an increase in the amount of community-based terms for sixth year students. It is now mandatory for all final year students to complete at least one 4-week rural term and the opportunity is present for students to participate in up to three 4-week rural terms. In terms of student interest in the rural surgical attachments, the top two requested surgical SCAPs options for 1999 were rural terms. While the initial group of students who participated in the rural attachments was perhaps self-selecting, word of mouth has filtered through to the remainder of the student population that the rural terms are worthwhile. A study investigating the first year experience of clinical attachments in community-based general practice in Scotland found similar increases in student interest with subsequent years (Grant et al 1997).

Outcomes in terms of student satisfaction and exam results have been established, but a further outcome may be in an increased number of graduates seeking a career in rural medicine. An increased exposure to rural medicine as an undergraduate has been documented as one of the major influences on eventual practice location (Rolfe et al 1995). The study of graduates from the University of Newcastle medical school

determined that those graduates who had chosen an undergraduate rural general practice attachment in their final year were more likely to become rural doctors. It must be said however, that while this particular study is quoted by many researchers and government groups as overwhelming evidence for increased undergraduate rural terms, the researchers from the University of Newcastle concluded that it was difficult to determine the strength of association between curricular exposure and career choice. A large graduate follow-up study in Canada of 159 graduates determined that while there was a strong statistical link between having been raised in a rural community and practising in a rural location following graduation, there was no apparent association between exposure to rural practice during undergraduate or residency training and choosing to practise in a rural community (Easterbrook et al 1999). The Canadian study only examined family medicine program members and may have been somewhat limited in the definition of rural being a community of 10,000 inhabitants or less. In contrast, another North American graduate study from Philadelphia determined that participation in a rural preceptorship in the senior medical undergraduate year was a strong predictor in determining the likelihood of a future rural practice, with those students who undertook a rural term found to be 2.4 more times likely to pursue a rural career (Rabinowitz et al 2001). As with the studies from Newcastle and Canada, the Philadelphia study was primarily concentrated on community medicine rotations and no mention was made of any student choosing a career in rural surgery.

The graduate follow-up study from the rural surgical terms was encouraging in several aspects, especially with regard to choice of future practice and the influence that the rural term had on ultimate career path choice. The positive influence of the term was particularly marked in those graduates who are now pursuing rural general

practice as a career and for the three surgical trainees who replied to the survey. Indications were strong that the general practice group would seriously consider future practice locations in a rural area. The high level of significance detected for the rural attachment with respect to those graduates who chose general practice needs to be placed in perspective as six of the eight general practice trainees indicated that they had had some degree of rural upbringing.

The finding that the project exerted a greater influence on students to follow a rural general practice path despite being a surgical term correlates with the results of a follow-up study performed on students who completed a rural surgery undergraduate term (Martin et al 1981). In this study from the University of Louisville, it was discovered that 26% of the students who undertook the rural surgical clerkship selected family medicine as their choice of specialty compared to 16% of the students who completed their surgical clerkships in the city tertiary hospitals. While it is difficult to draw any direct comparisons with the University of Louisville study, it is interesting to note that of the University of Adelaide graduates who returned their follow-up survey forms, approximately one third have chosen a career in general practice. A similar project in rural family medicine was developed in Alberta, Canada and concluded that without such a program, there would have been a loss of family physicians in the rural area (Chaytors and Spooner 1998).

Many of the responses obtained in the 1998 CEDU student study that indicated high levels of student satisfaction in terms of rural term supervision, enjoyment, teaching and practical experiences were also noted in the graduate follow-up study. It must be emphasised that this is an observation only and can not be validated statistically as the original CEDU study was confidential. Nevertheless it would seem reasonable to

suggest that for many of the graduates who participated in the rural surgical rotations, the experience was positive in learning and enjoyment terms.

At this stage of their post-graduate careers, still several years away from fellowship examinations and a final practice location, it remains unknown whether the encouraging results from the graduate study will translate to an increased number of rural doctors. For any estimation of the project's final impact on rural workforce numbers, continuing follow-up will be needed and given the problems in locating the original student group, these studies will undoubtedly prove to be challenging to undertake.

Our findings of over 80% of the students feeling positive about a post-graduate rural career concurs with a Western Australian study determining that 81% of fourth year students participating in a 4-day rural placement expressed an interest in a rural career following the conclusion of the placement (Talbot and Ward 1999). It appears that the timing of the rural terms within the undergraduate terms is important as early exposure may not have the same impact as a rotation in the later years of the medical course. A United States study concluded that brief exposure to rural medicine early in the curriculum had little effect on variables that might precede practice location decisions (Lynch and Willis 2000). If the seed of country medicine can be planted prior to completion of the undergraduate program, the students will be much more likely to consider it as a viable option. By the time graduates have completed an intern year and a subsequent resident year, the concept of life in the country often needs to compete with the forces of marriage, family, friends, mortgages and training programs. Research from Western Australia has shown that while many medical

students are able to predict their work practice by final year, a large number remain undecided (Shapiro et al 1988).

Little information exists in published literature with regard to the effect of post-graduate rural surgical rotations on eventual practice location. The Dalhousie University in Halifax, Canada has a post-graduate program that requires all first year residents to spend time in a small community as part of their training. Follow-up studies have demonstrated that over 50% of specialist trainees, including those in general surgery, chose rural practice locations (Gray et al 1994). As has been discussed previously, several provincial locations exist in South Australia that may provide scope for a surgical trainee. The Eastern states of Australia have had well established rural surgical rotations for all general surgical trainees and it is expected by participants of the general surgical programs in these states that they will at some stage during their training spend 6 months in a provincial centre. Since the completion of the surgical workforce study, positions for surgical registrars have been developed in the Riverland region and in Whyalla. The Riverland position is a non-accredited position presently, however it is predicted that this will develop into a 6-month position for a trainee registrar. The Whyalla rotation consists of a monthly stint undertaken by advanced trainees within the general surgical program. This has allowed many trainees to experience the rural environment for the first time since no undergraduate rural surgical attachments existed when the current group of advanced trainees were medical students. A survey performed on the participating trainees in 2000 demonstrated that despite finding merit and enjoyment in a rural term, little change in attitudes towards rural practice occurred following the Whyalla rotation. This lends further support to the theory that changing attitudes towards rural medicine is more likely to occur at the undergraduate level.

When looking solely at the question of inspiring medical students to undertake surgery as a career option, current opinion is that increasing attempts should be made to expose medical students in their pre-clinical or clerkship years to positive surgical role models (Polk 1999, Erzurum et al 2000). An innovative suturing skills workshop for first and second year medical students was held at the University of Virginia and it was noted that "the relaxed atmosphere encouraged dialogue between the students and surgeons and encouraged questions pertaining not only to technical skills and clinical experiences but also to lifestyle and career" (Raymond et al 2001). With increasingly less input into medical school curricula, surgical departments need to maximise the opportunities that remain to illustrate the merits of a surgical career, without compromising the fundamental aim of providing surgical education for the "undifferentiated practitioner".

A recent local development in rural training has occurred this year with the establishment of rural intern positions within the family general practice division of the University of South Australia's Whyalla campus and it will be of interest to follow the career paths of the rural interns. The new Australian College of Rural and Remote Medicine (ACRRM) has commenced establishing rural community rotations for trainees in their immediate post-graduate years and this may herald a more vertically integrated rural training scheme (Prideaux 2001). By putting these long-term strategies in place, the future of rural medicine is promising and if only one student each year is inspired to undertake a career in rural surgery then the surgical workforce dilemma can be successfully addressed within the space of 10 years.

The Future - Finance

One of the biggest stumbling blocks with regard to the long-term future of the project is finance. In the current environment of economic rationalisation, funds for teaching as a separate entity are difficult to procure, despite hospitals having a sizeable component of their budgets earmarked for teaching (Prideaux 2001). In order to maintain a high standard of medical practice in Australia, it is imperative that undergraduate, graduate and postgraduate programs are maintained. The financial problem may deteriorate with increasing outsourcing of health services and administration to private companies who may fail to see teaching as a profitable short-term health-care "product". It has been floated in some areas that private hospitals may provide a source of undergraduate teaching, however private hospitals have a responsibility to their shareholders and the added cost associated with educating students may be at odds with profit seeking. Studies from the United States have shown that there is an extra cost of 10-20% to overall budget associated with a teaching hospital when compared to a non-teaching hospital (Garber et al 1984, Zimmerman et al 1993). These same studies found that in terms of patient outcomes, results were better in the tertiary hospital when compared to the non-teaching hospital. The cost however to all sections of the community of inadequate funding is immense in the long-term when the standard of health care professional falls due to inadequate teaching. The emergence of the rural-based medical schools will undoubtedly be another factor in the division of the funding "pie".

The Future – Teachers

It can be safely assumed that the economic pressures on all spheres of the medical system are unlikely to dissipate and the problem of teacher payment/recognition is unlikely to be resolved in the near future. While it could be argued that appointment to a hospital as a specialist carries an inherent responsibility to teach undergraduates and junior medical staff, the additional time taken to teach often impedes on service duties. It has also been suggested that monetary payments be made for teaching sessions. Currently, all of the rural surgeons involved in the student rotations have been awarded clinical titles from the University of Adelaide.

Fortunately at the present time, enough staff is willing to teach on a voluntary basis, but whether this situation will persist into the future is unclear. Where the teaching burden falls to one or two teachers, as is the case with the rural attachments, provision needs to be made for support mechanisms. Student numbers need to be carefully monitored and as has been mentioned previously, the future impact of the new rural medical schools in South Australia is unknown. Experience from the United Kingdom would suggest that there is increasing difficulty in recruiting general practitioners for community-based education purposes (Parry and Greenfield 2001). Increasing numbers of students for a decreasing pool of tutors would result in less direct supervision and one-to one teaching. Unfortunately despite the provision of adequate locum support and scrutiny of student numbers, the rural surgeon at Port Pirie felt that he was unable to continue to provide rotations for final year students.

The Future - Curriculum

One of the major benefits that emanated from the establishment of the new program, was a review of the curricular structure in general. Traditional methods and locations of teaching were scrutinised and lectures were revamped. Perhaps more than in the past, students were asked their opinions on lecture topics and recent graduates were also consulted with regard to what they considered to be relevant topics for sixth year teaching. The CEDU evaluation also represented an example of student feedback and with the full-scale implementation of the SCAP program in 1999, student feedback was sought for all of the elective and mandatory terms. For improvement in teaching standards to occur, dissemination of this student-driven evaluation needs to be made available to all staff involved in student teaching. Of more importance is a realisation by the teaching staff, especially those well entrenched in the major teaching hospitals, that teaching methods can be improved, often by adopting the principles of adult learning. This may be as simple as providing students with constructive feedback at varying stages throughout their terms. Many of the rural SCAP students remarked that feedback did occur on a regular basis with their rural surgical mentors. Subsequent research by the University of Adelaide Medical Education Unit has confirmed the belief that students are more likely to be treated as colleagues by the rural surgeons compared to the city-based surgeons (Leahey and Petersen 2000).

Methods of assessment were also scrutinised, but the difficulty here lies with devising a standard form that is simple to use and will give an accurate and reproducible rating for any particular student in any number of educational settings. The added problem with the subjective assessment form used for the SCAPs is that with the new community-based medical education approach and expansion of the SCAP program, the potential number of term preceptors or supervisors assessing the students is very

large. In 1999, a total of 120 SCAPs were offered to final year students, encompassing medicine, surgery, primary care and psychiatry. In its current form, the University of Adelaide ward assessment form may be the simplest tool to use. As described previously, the addition of one or two descriptors to the form, may improve the ability of this subjective method to distinguish between competent students and those who require additional work before embarking on their postgraduate careers.

The final written examinations and OSCE have been validated as useful methods of assessment, however the timing of the examinations can be questioned. For many of those involved in student teaching in the traditional surgical clerkship setting, it became apparent that the time spent by students on the ward was directly related to time of the year. If exams were approaching, then students were extremely reluctant to participate in ward duties and instead preferred the sanctity of the library. Primarily to allay student anxiety, care was taken not to schedule any students for rural surgical placements during the final term of the academic year. Earlier reference was made to the major point of negative student feedback being the fear of missing a lecture or tutorial in Adelaide. This fear was not the sole province of the rural students, as often students in city terms would excuse themselves from the ward to attend tutorials, both official and unofficial. Passing the final examinations had become the overwhelming drive for many of the students, rather than gaining valuable clinical experience that would be needed on commencement of their internships, approximately one month following their final examinations. The question could be raised whether the intense exam focus allows the student to adequately prepare for commencement for life as an "undifferentiated practitioner". The curriculum committee has now resolved to look at the issue of the timing of the "final" written/OSCE examinations. If the final year of the medical undergraduate course was left free of the spectre of examinations, more

effective clinical learning may result. Other researchers have argued that rather than subject students who undertake the more innovative community based terms to the traditional examinations, correspondingly "innovative" assessment methods should be used instead (Oswald et al 2001).

The University of Adelaide sixth year curriculum may reflect a slightly unique "hybrid" approach to its community-based format. As has been described previously in the text, most examples of community-based medical education focus on primary care or general practice as their templates and certainly the evidence now clearly suggests that general practitioners are highly effective as educators (Gupta and Spencer 2001). The generalist education given to the Flinders University students undertaking an entire year in a rural location under the supervision of a general practitioner has been well documented (Worley et al 2000). Recent work from Cambridge in the United Kingdom also highlights the efficacy of primary care as an educational model (Oswald et al 2001). Few studies have been performed with specific reference to specialist driven community-based education. In terms of the numbers of teaching opportunities, there is no question that primary care can offer the larger numbers, however ample provision does exist within the specialist sector to construct rotations consistent with the aims of community-based education.

To transfer the teaching of undergraduate teaching completely to the "generalist" practitioner in a primary care orientated rotation, would have major long-term ramifications for the instruction and recruitment of post-graduate surgical trainees. In an environment where general surgery is in some countries struggling for applicants, a diminishing presence of positive surgical role models would lead to further negative trends for surgical workforce numbers. The decline in interest in surgical careers has reached an alarming level in the United States and increased efforts to enhance the

interest of medical students in surgery have been called for by the American College of Surgeons (Sachdeva 2002). These include early exposure of students to surgery, effective role modelling and mentorship.

Surgeons can continue to play an important role in surgical undergraduate education and at the same time adhere to current medical education philosophy and practice.

CONCLUSION

From the results of the research performed in the completion of this thesis, the following conclusions can be made. Teaching a surgical curriculum to undergraduates in an environment outside of the traditional tertiary hospital environment is feasible. From the objective results obtained from the student groups who undertook the rural surgery and day surgery terms it can be determined that the education received in these locations was at least as effective as the remainder of the student group. The students felt that the rural terms excelled in the aspects of enjoyment and an increased number of practical procedures were experienced when compared to the general surgery terms in the metropolitan hospitals. Many of the students commented that following the terms, they felt more confident with regard to a rural postgraduate career.

The new final year surgical curriculum allows the student a greater degree of choice, and at the same time moves towards an increasingly community oriented medical education. The rural surgical workforce in rural South Australia is an area of community need and while it is still too early to determine whether the project will result in increased numbers of graduates flocking to the country, preliminary indications from the graduate follow up study would suggest that the rural terms did exert a positive influence on a number of students.

APPENDICES

Appendix I

An Audit of Surgical Services in Rural South Australia

Rural SA is no different from other rural areas in Australia in facing a crisis in terms of a shortage of medical manpower. The situation regarding the lack of general practitioners has been well chronicled. However, while it is generally assumed that the same applies to rural surgical services, finding evidence to support this theory is scarce.

In his Foundation lecture to the Division of Rural Surgery in May 1996, Prof. I. Faris stated, "it is estimated that two new surgeons will be needed in rural Victoria each year for the foreseeable future. What is the situation in South Australia? Are rural surgeons here also reaching retirement age without prospect of replacement general surgeons being found?"

With the continuing reluctance of general practitioners to venture outside the city and suburbs, the GP who performed surgical procedures or indeed still performs surgical procedures, is becoming extinct as they reach retirement. What percentage of GP's are still performing surgery in rural South Australia?

In recent years, the Royal Australasian College of Surgeons has addressed the impending crisis in rural surgery by implementing various programmes aimed at increasing rural training opportunities in the hope that the trainees will be encouraged to practise in these regions. Focus has traditionally been on providing advanced positions in the Eastern states with their large regional centres. Does South Australia have the potential to provide for advanced surgical positions in our larger regional hospitals?

A survey is to be conducted involving a selection of rural hospitals in South Australia. Personal contact with the CEO's of most (if not all) of the surveyed hospitals is also envisaged. The proposal is to provide the answers to the following questions.

1. Who is performing surgery in rural South Australia?

2. Is there a current problem with availability of services?

3. Are there regional centres in South Australia capable of providing a suitable environment for advanced surgical trainees?

It is hoped that the study can be completed by December 1997.

M. Bruening (Department of Surgery TQEH)

General Surgery in Rural South Australia
(please mark the appropriate options)

1. Location:

2. Number of beds:

3. Are there operating theatre facilities in your hospital?

- ☐ yes
- ☐ no

4. Are General anaesthetics being performed in your hospital?

- ☐ yes
- ☐ no

5. Who administers the general anaesthetic? (there maybe more than one answer)

- ☐ specialist anaesthetist – local
- ☐ specialist anaesthetist – visiting
- ☐ general practitioner anaesthetist
- ☐ RFDS anaesthetist

6. Number of General surgical operative cases per year?

- ☐ < 100
- ☐ 100–200
- ☐ 200–300
- ☐ > 300
- ☐ exact number - (if available)

7. Frequency of elective General surgery performed?

- ☐ 2 or more lists per week
- ☐ weekly
- ☐ fortnightly
- ☐ monthly
- ☐ other – specify

8. Who performs the surgery? (there maybe more than one answer)

- ☐ specialist – local/regional
- ☐ specialist – visiting
- ☐ general practitioner

9. Frequency of non–elective or emergency General surgery (requiring GA)?

- ☐ 2 or more times per week
- ☐ weekly
- ☐ fortnightly
- ☐ monthly
- ☐ no facility for emergency surgery

10. If emergency surgery is performed, who performs it? (there may be more than one answer)

- ☐ specialist – local/regional
- ☐ specialists – visiting
- ☐ general practitioner

11. How often is transfer of a General surgery case to a regional hospital required per year?

- ☐ 0 – 10
- ☐ 10 – 20
- ☐ 30 – 40
- ☐ 40 – 50
- ☐ >50

12. How often is transfer of a General surgical case to a tertiary centre required per year?

- ☐ 0 – 10
- ☐ 10 – 20
- ☐ 30 – 40
- ☐ 40 – 50
- ☐ >50

13. What is the availability of the following subspecialties?

Plastics

☐ Resident

☐ Visiting – weekly, monthly, less frequently (specify)

☐ Not available

Orthopaedics

☐ Resident

☐ Visiting – weekly, monthly, less frequently (specify)

☐ Not available

ENT

☐ Resident

☐ Visiting – weekly, monthly, less frequently (specify)

☐ Not available

Urology

☐ Resident

☐ Visiting – weekly, monthly, less frequently (specify)

☐ Not available

Gynaecology/Obstetrics

☐ Resident

☐ Visiting – weekly, monthly, less frequently (specify)

☐ Not available

Ophthalmology

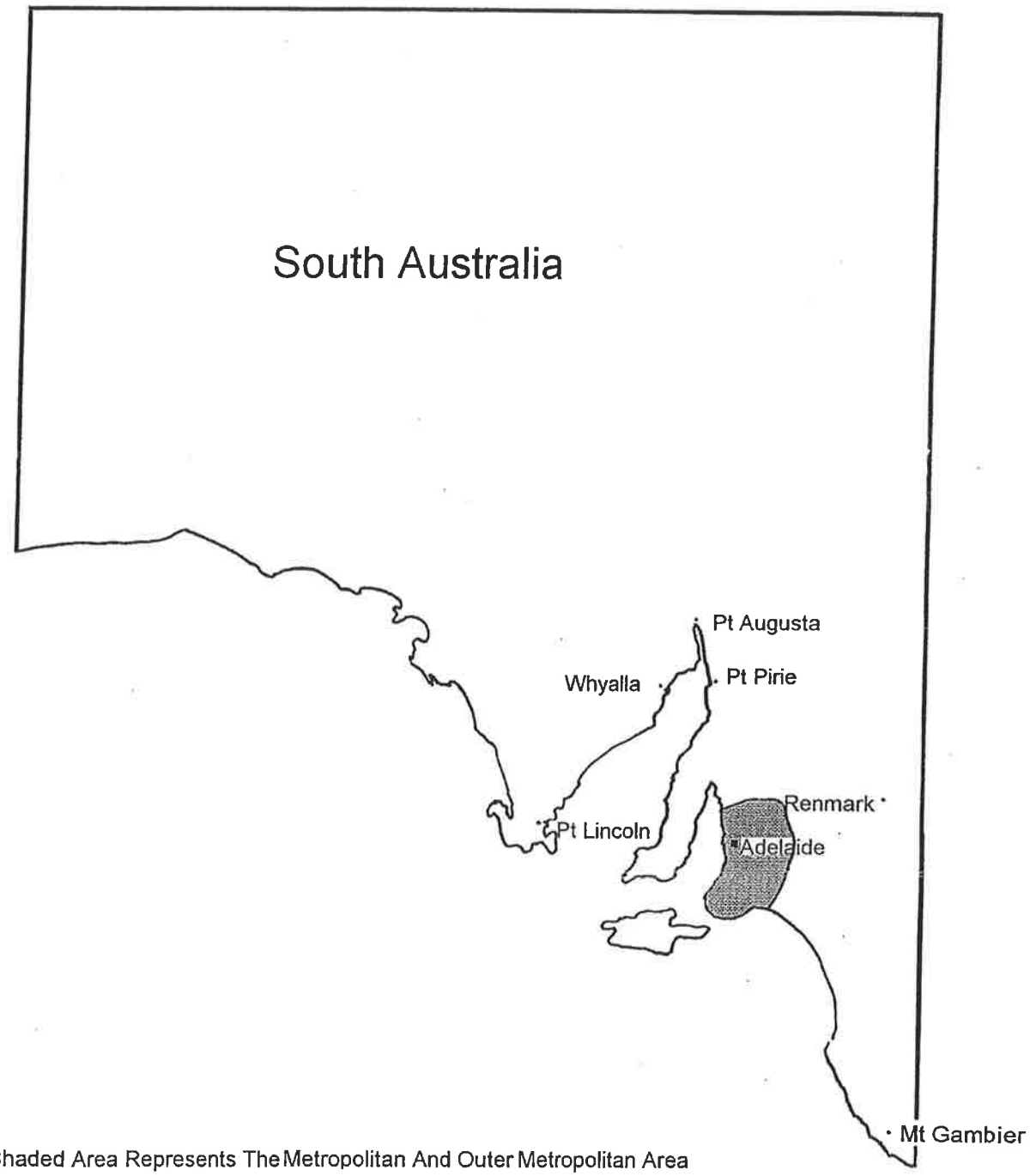
☐ Resident

☐ Visiting – weekly, monthly, less frequently (specify)

☐ Not available

Thank you for your participation

Appendix II



- Shaded Area Represents The Metropolitan And Outer Metropolitan Area

Appendix III

20th October, 1997

Dear ,

The crisis facing rural medicine in general has been well documented, often with reference to the general practitioner population (or lack of it!). The Department of Surgery at The Queen Elizabeth Hospital in Adelaide is looking at various initiatives in regards to rural general surgery. By surveying a cross section of rural general surgeons, we hope to gain valuable information as to the major obstacles to attracting surgeons into the country.

We realise that time is precious and hopefully you will not find the enclosed questionnaire too lengthy. If your responses could be mailed back to us by the end of November, we would be extremely grateful. The responses will be confidential and used for statistical purposes only.

Yours sincerely,

Dr M. Bruening
Lecturer in Rural Surgery

Guy Maddern
R.P. Jepson Professor of Surgery

Demography of Rural General Surgeons

(please tick the appropriate answer)

1. Age:

2. Sex:

3. Marital status:

4. Medical qualifications and dates(inc. post grad):

5. Current main practice location:

6. Number of years spent in your current location:

7. Number of other general surgeons in current location:

8. On call frequency
   - ☐ 1 : 1
   - ☐ 1 : 2
   - ☐ 1 : 3
   - ☐ 1: 4
   - ☐ less frequently

9. Size of the main hospital at which you operate:
   - ☐ < 50 beds
   - ☐ 50 – 100 beds
   - ☐ 100 – 150 beds
   - ☐ 150 – 200 beds
   - ☐ > 200 beds

10. At how many other hospitals do you operate?
   - ☐ none
   - ☐ one
   - ☐ two
   - ☐ three

11. Who administers your general anaesthetics? (there may be more than one answer)
   - ☐ specialist anaesthetist – resident
   - ☐ specialist anaesthetist – visiting
   - ☐ general practitioner – resident
   - ☐ general practitioner – visiting/RFDS

12. Number of days spent at meetings/conferences etc in the past 12 months?
- ☐ 0 – 5
- ☐ 5 – 10
- ☐ 10 – 15
- ☐ > 15

13. Number of weeks taken as recreation/leave in the past 12 months?
- ☐ < 2 weeks
- ☐ 2 – 3 weeks
- ☐ 3 – 4 weeks
- ☐ 4 – 5 weeks
- ☐ 5 – 6 weeks

14. What is the availability of locum surgeons?
- ☐ no difficulty in obtaining
- ☐ some difficulty in obtaining
- ☐ great difficulty in obtaining

15. Number of years envisaged remaining in practice at current location?
- ☐ 0 – 5 years
- ☐ 5 – 10 years
- ☐ 10 – 15 years
- ☐ > 15 years

16. Do you have children?
- ☐ yes
- ☐ no

17. What age group(s) are your children in?

	Child No.			
	1	**2**	**3**	**4**
< 5 years				
5 – 12 years				
13 – 18 years				
> 18 years				

18. Where do/did your children receive their schooling?

	Child No.			
	1	2	3	4
local primary				
local secondary				
regional primary				
regional secondary				
city boarding				

19. If your children are past school age, where do they now reside?

	Child No.			
	1	2	3	4
locally				
nearest major regional centre				
capital city				
other (please specify)				

20. Prior to your tertiary education, was any of your upbringing in a rural region?

- ☐ 0 – 10 years
- ☐ 10 – 20 years
- ☐ nil
- ☐ from overseas

21. How many hours per week on average do you work?

- ☐ < 40
- ☐ 40 – 50
- ☐ 50 – 60
- ☐ 60 – 70
- ☐ > 70

22. Is your spouse employed?

- ☐ yes
- ☐ no

23. Where is your spouse employed?

- ☐ connected with your practice
- ☐ in the medical/nursing/health professional field
- ☐ completely unrelated to the health profession

24. On moving to the country, has your spouse been able to find a position in their chosen profession?

- ☐ yes
- ☐ no

25. What are the most positive aspects about rural general surgical practice? (there may be more than one answer)
    - ☐ income
    - ☐ lifestyle
    - ☐ professional autonomy
    - ☐ range of operative cases

26. What are the most negative aspects about rural general surgical practice? (there may be more than one answer)
    - ☐ income
    - ☐ lack of privacy
    - ☐ spouse employment opportunities
    - ☐ peer isolation
    - ☐ schooling opportunities
    - ☐ continual on call work.

Thank you for your participation

THE UNIVERSITY OF ADELAIDE

FACULTY OF MEDICINE

STUDENT INTERNSHIP ASSESSMENT FORM (6TH YEAR)

STUDENT'S NAME: .....

Surname (Block Letters) First Name

ASSESSOR'S NAME: HEAD OF UNIT UNIT:

DATES OF ATTACHMENT - FROM TO

INSTRUCTIONS TO ASSESSORS

The main purpose of 6th year student ward assessment is to identify students who have not achieved the expected level of clinical performance. Students about whom you have significant reservations in any of the three areas listed below should be given a **C rating.** Your judgement should be a collective one made by all staff in contact with the student and should be based on overall ward performance and performance on an observed long case. Awarding a "C" will ensure such students are counselled and remedial action taken. A "C" rating will only have major consequences for the student if they are unsatisfactory in other components of their assessment (e.g. final exams).

Please rate each of the components listed below using the following criteria:

A. This student has performed at or above the standard I expect of a commencing intern.

B. This student has performed quite satisfactorily but needs to improve in some areas to reach the standard I expect of a commencing intern.

C. This student has not performed to the standard I expect of a commencing intern.

1. Ability to take a history and to perform the clinical examination. | A | B | C |

2. Ability to synthesise and use clinical information (making provisional diagnosis; planning investigations and therapy; writing good case records). | A | B | C |

3. Inter-personal and communication skills (relating to patients and staff; presentation of cases). | A | B | C |

Comments on students strengths and weaknesses.

_____

_____

_____

[Please Note: Ratings cannot be altered once returned to the Faculty.]

Signed: ..... Date: .....

Please return completed form to the Clinical Studies Office at your hospital.

OBSERVED LONG CASE ASSESSMENT

(To be undertaken during the last two weeks of the internship)

STUDENT'S NAME: ..... DATE: .....

..... Surname First Name

ASSESSOR'S NAME: ...HEAD OF UNIT (Block Letters)

INSTRUCTION FOR OBSERVER:

The purpose of this exercise is to directly observe the basic skills of clinical practice. You should use this to help finalise your overall assessment and to detail strengths and weaknesses in order to provide feedback. **THIS IS NOT A VIVA EXAMINATION.**

FORMAT	TIME
Observation of student undertaking history and examination	40 mins.
Time for student to prepare for presentation	5 mins.
Presentation of case and discussion of findings/conclusions	15 mins.
Feedback on performance	5-10 mins.

A. OVERALL PERFORMANCE: Please tick the most appropriate statement.

This student has performed the clinical examination (including synthesis) at or above the standard I expect of a commencing intern.

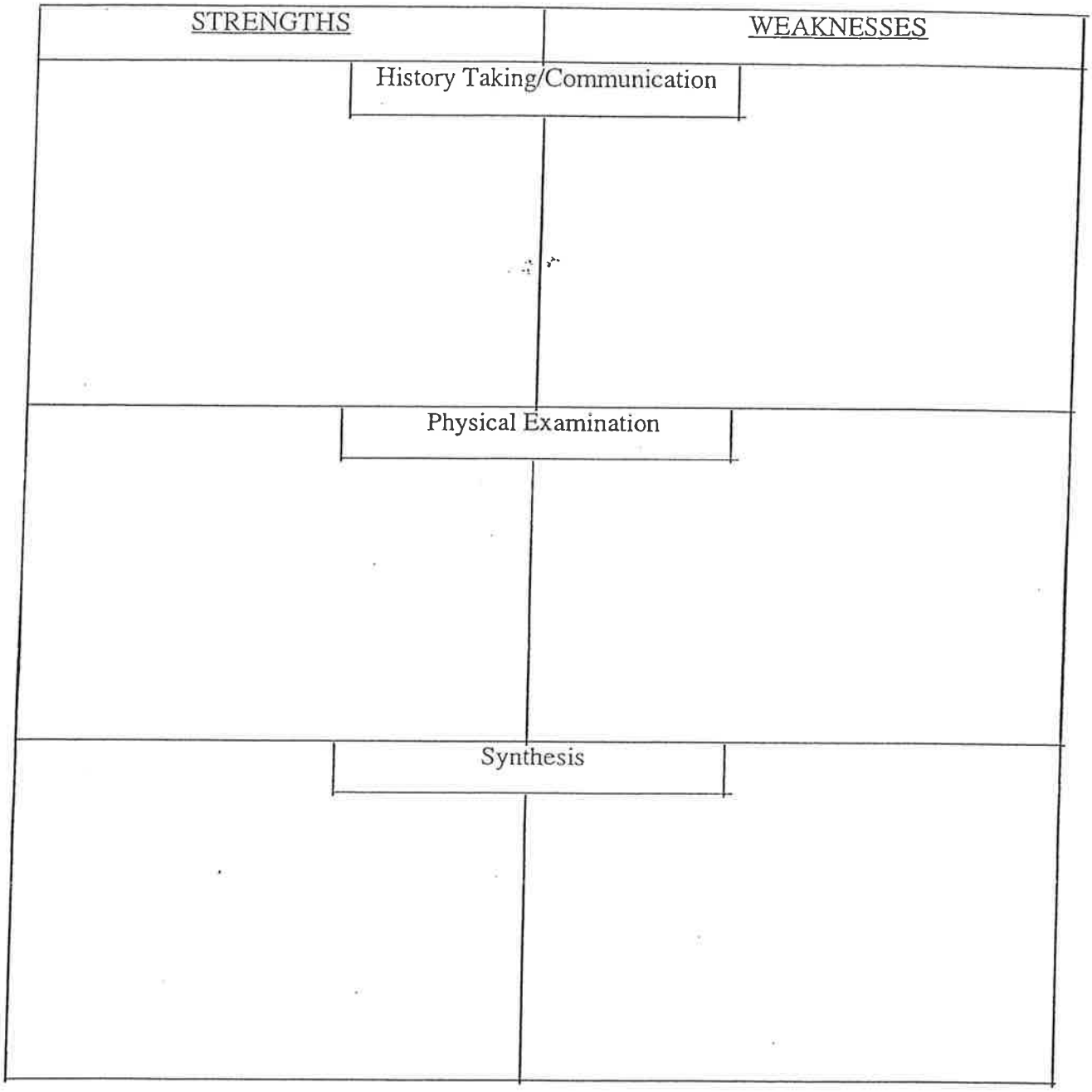
This student has performed the clinical examination (including synthesis) quite satisfactorily but needs to improve performance in some areas to reach the standard I expect of a commencing intern.

This student has not performed the clinical examination (including synthesis) to the standard I expect of a commencing intern.

This student has performed the clinical examination and synthesis so incompetently that special remedial help is required.

B. OVERLEAF, PLEASE DOCUMENT THE MAIN STRENGTHS AND WEAKNESSES OF THE STUDENT'S PERFORMANCE.

Signed: .....



Please attach completed document to the Student Internship Assessment Form

June 5, 1998

Appendix V

14th November, 1997

Dear Student,

As you are probably aware, the University of Adelaide is planning to make some important changes to the final year curriculum. From 1998 onwards, a percentage of 6th year students will be placed in country locations for part of their surgical attachment. The time spent in the country would be four weeks and the intention is that the students will travel in pairs. Accommodation and travel expenses will be subsidised. Next year the participating hospitals are Port Augusta, Port Pirie, Port Lincoln and Mt. Gambier.

Obviously with the end of the year approaching rapidly, various logistical structures need to be put in place if the attachments are to commence at the beginning of 1998. However, we do want student input before anything is finalised.

We realise that presently you all have more pressing matters on you minds, however we would appreciate completion of the attached questionnaire by December the 12th. Your preferences will be taken into account as much as possible, but please be aware that the country terms will be filled before the city specialty terms.

Good luck for the exams.

Yours sincerely,

Martin Bruening
Lecturer in Rural Surgery

enc

QUESTIONNAIRE
STUDENT PLACEMENT - COUNTRY LOCATIONS

The metropolitan general surgical clerkships will be of four weeks duration and at this stage will incorporate anaesthetics. The subspeciality clerkships are mostly of two weeks duration (exceptions are RAH ophthalmology and orthopaedics). Only one student per subspecialty will be allocated.

Name _____

(1) Is there any reason why you can not undertake a country term?

(2) Do you have your own transport?

(3) Students will be sent in pairs to the country centres. Is there anyone in particular with whom you wish to be paired? (i.e. married couple)

Please fill in your preferences for the various attachments and send them to the Clinical Studies office, Level 2, The Queen Elizabeth Hospital, Woodville Road, Woodville, S.A. 5011, by December 12.

All details regarding accomodation will be outlined during the 1st academic week in 1998.

P.T.O

General surgery student internships – city

	Four weeks
	RAH: Professorial Surgical Unit (Upper GI)
	RAH: Hepatobiliary Unit
	RAH: Breast Endocrine Unit
	RAH: Colorectal Unit
	TQEH: Professorial Surgical Unit (Upper GI/hepatobiliary)
	TQEH: Breast Endocrine Unit
	TQEH: Colorectal Unit
	Modbury: General Surgery
	Lyell McEwin: General Surgery

Rural/Specialist student internships

	Two weeks	Two weeks
	Pt Augusta	Pt Augusta
	Mt Gambier	Mt Gambier
	Pt Lincoln	Pt Lincoln
	Pt Pirie	Pt Pirie
	RAH ortho	RAH ortho
	TEQH plastics	TQEH urology
	RAH urology	RAH neurosurgery
	Mt Barker	RAH vascular
	RAH plastics	RAH craniofacial
	TQEH ortho	TQEH vascular
	RAH ophth	RAH ophth
	RAH Ent	RAH ICU
	TQEH ophth	TQEH ortho
	TQEH day surgery	TQEH day surgery

Please number your preferences in the spaces provided

Appendix VI

Log Book

Welcome to your final year of medical school and thank you for participating in the new initiatives under the Department of Surgery. This clinical student log book concept was trialed in 1997 by the Day Surgery Unit at TQEH, and due acknowledgment must go to Drs G. Rudkin, F. Thompson and E. O'Driscoll. In 1998 we would like to extend the log book concept to include all participants in the country surgical attachments. The log book would also continue throughout the 4 week metropolitan general surgical teaching block.

The aims of the log book are as follows;
(i) an accurate record of the students experience in the country and city settings.
(ii) to make us aware of any potential problems which may arise as a result of the new initiatives.

The logbooks are to be handed in at the completion of your 8 week surgical term and will not be "assessed."

The differing categories comprising the log book are as follows;

1) A copy of the undergraduate course manual for surgery. This allows you to keep a record of what you have seen or completed with specific reference to the core topics.

2) A copy of the anaesthetic objective list. The Department of Anaesthesia is also interested in evaluation of 'the country experience' and as such would appreciate it if the appropriate form could be filled in.

3) A list of our objectives for the country attachments.

4) Various sections for you to record your experiences.

Clinical cases
A record of all the cases with which you have had personal contact. This 'contact' may comprise of admitting the patient, assessing a patient in casualty or assisting with an operation on the patient (with subsequent post-op care).

Operative cases
A record of all the cases you saw in theatre. Make sure to record whether you were an observer, an assistant or even involved with the anaesthetic. If you were involved with the anaesthetic don't forget to fill in you anaesthetic form as well.

Outpatient attendances
A record of all the clinics you attended. In all locations there is sufficient scope to attend subspecialty clinics.

Procedures
A record of all the procedures you performed. It is important to realise that you need to be supervised while performing these procedures.

It is important for you to ask your surgical supervisor to initial the operative case and procedure sections in particular.

There is also an important blank section at the end of the book where you can record your thoughts on your attachment. Was it a waste of time? What could be done differently? Do you wish you had brought your fishing rod?

It is expected that for 1998, there may be one or two teething problems and as with the Starship Enterprise, "you are boldly going where no man has gone before."

Remember that you are representing the University of Adelaide and yourselves and to observe the usual etiquette when dealing with patients, nursing and medical staff. Please bring your I.D. badges!

Any queries can be directed to Dr. Martin Bruening, the Department of Surgery, The Queen Elizabeth Hospital.

Aims for the Country Surgical Attachments

- Reinforce the objectives as outlined in the surgical undergraduate course manual.
- Appreciate the range of surgery as performed by rural surgeons.
- To participate in after-hours cases.
- To perform essentially as an intern, given the rural attachments will provide tremendous scope for this as none of the hospitals have resident medical staff.
- To present one interesting case per week as a case study to your surgical supervisor.
- To enjoy yourselves and appreciate the many facets of rural practice.

Contact numbers/personnel

Pt Augusta Hospital phone number (08) 86485500

Director of Medical Services – Dr N. Lian-Lloyd

Pt Pirie Hospital phone number (08) 86321022

Chief Executive Officer – Mr R.Kirchner
Resident Surgeon – Mr S. Ali

Pt Lincoln Hospital phone number (08) 86832200

Chief Executive Officer – Mr J. Pryzbylski
Resident Surgeon – Mr. I. Fletcher

Mt Gambier Hospital phone number (08) 87211200

Director of Medical Services – Dr J. Foley
Resident Surgeons – Mr Strickland
Mr M. Landy

Whyalla Hospital phone number (08) 86488300

Director of Medical Services – Dr P. Rainsford
Resident Surgeons – Mr L. Isabel
– Mr M. Patkin

Outpatient Attendances

Date	Type of clinic attended (i.e. general)

Procedures

Date	Type of procedure	Who supervised?

Whyalla
– contact Dr P. Rainsford's secretary one week prior to your arrival
– keys can be collected from admissions/reception desk
– meet surgeons on surgical ward (0800) first Monday
– the surgeons are Mr Patkin and Mr Isabel

Port Augusta
– keys can be collected from reception/switchboard
– meet surgeon on surgical ward (0800) - first Monday
(as the surgeons change on a weekly basis, it may be advisable to page the surgeon when you arrive in Pt. Augusta – provided it is at a reasonable hour!)

Port Pirie
– contact Mr A. Alderdice (personnel) one week prior to your arrival
– keys can be collected from admissions/reception desk
– meet surgeon on surgical ward (0800) – first Monday
– the surgeon is Mr Ali

Port Lincoln
– contact Leanne Reid in the Community Health centre at Pt Lincoln hospital one week prior to your arrival
– keys can be collected from casualty front desk
– meet surgeon on surgical ward (0800) – first Monday
– the surgeon is Mr Fletcher

Mount Gambier
– contact Ms J. Hateley (medical admin) one week prior to your arrival
– keys can be collected from casualty front desk
– meet surgeon in theatre (0830) – first Monday
– the surgeons are Mr Landy and Mr Strickland

General Points
– do not forget to wear I.D. badges
– everything you do on the ward, in casualty or in theatre must be under the supervision of a medical officer
– remember to get things countersigned
– you are not restricted to purely general surgery
– each hospital has a needle stick protocol, contact the occupational health sister during working hours and the nursing coordinator after hours
–contact Ms Christina Dyte in the Department of General Practice regarding the transport reimbursement

Appendix VII

SURGICAL RURAL HOSPITAL PLACEMENT

Post-placement evaluation questionnaire

The following questions relate to the rural placement you completed recently. Surgical rural hospital placement is a new approach to surgical attachment and we need to gather as much information about its strengths and weaknesses as possible. You can help to improve the program for future students by completing all the questions — including the "comments" sections — as fully and frankly as possible.

Your responses are confidential to the evaluation team.

Your details

Name _____

Dates of rural placement From _____ to _____

Location of rural placement _____

Name(s) of supervising surgeon(s) _____

_____

Name(s) of other clinical teachers _____

_____

Clinical experience

1. During your rural placement, did you act as an "intern"? Yes No

   If no, how would you describe your role?

   _____

   _____

   _____

2. On average, how many patients did you see each day? _____

3. On a scale of 1-10, how would you describe the variety of patient conditions you saw during your placement?

   not much variety ... a lot of variety

   1 2 3 4 5 6 7 8 9 10

Comments _____

_____

_____

4. What is your view of the usefulness of the clinical experiences gained in this rural placement, compared to an urban placement?

   much worse ... much better

   1 2 3 4 5 6 7 8 9 10

Comments _____

_____

_____

5. How would you describe the practical experience of surgery during your rural placement?

   very limited ... very extensive

   1 2 3 4 5 6 7 8 9 10

Comments _____

_____

_____

6. How would you describe the experience of other practical procedures during your rural placement?

very limited — very extensive

1 2 3 4 5 6 7 8 9 10

Comments _____

_____

_____

Aims for country surgical attachments

7. On a scale of 1-10, how well did the placement help you reinforce the objectives outlined in the surgical undergraduate course manual?

not well at all — very well

1 2 3 4 5 6 7 8 9 10

Comments _____

_____

_____

_____

8. On average, how many hours did you spend each week on clinical activities out of hours?
(ie outside 8am-5pm Monday-Friday) _____

Comments _____

_____

_____

9. On average, how many cases did you present each week to your teacher? _____

Comments _____

_____

_____

10. How enjoyable did you find your rural placement?

not at all enjoyable — very enjoyable

1 2 3 4 5 6 7 8 9 10

Comments _____

_____

_____

_____

Teaching

11. On average, how many formal teaching sessions did you have each week during your rural placement? _____

Comments _____

_____

_____

12. Overall, how would you rate the level of supervision/teaching on your rural placement?

very low — very high

1 2 3 4 5 6 7 8 9 10

Comments _____

_____

_____

Clinical Learning Objectives

Below is a list of the clinical learning objectives set for the year.

13. Please tick the appropriate box adjacent to each skill you have performed or observed.

performed or observed on rural placement	performed or observed at other times		
☐	☐	A/1	Collection of blood samples
☐	☐	A/2	Stool examination for occult blood
☐	☐	A/3	Collection of urine specimens and urinalysis
☐	☐	A/4	Collection of specimen for investigation for STD in either sex
☐	☐	A/5	Injections - intradermal; subcutaneous; intramuscular; intravenous
☐	☐	A/6	Establishment and maintenance of IV access
☐	☐	A/7	Central venous pressure measurement
☐	☐	A/8	Pelvic examination and use of a speculum
☐	☐	A/9	Indirect laryngoscopy
☐	☐	A/10	Ophthalmoscopy
☐	☐	A/11	Otoscopy
☐	☐	A/12	Measurement of intraocular pressure with a tonometer
☐	☐	A/13	Rectal examination and proctoscopy
☐	☐	A/14	Nasogastric intubation
☐	☐	A/15	Endotracheal intubation and suction
☐	☐	A/16	Throat culture and plating
☐	☐	A/17	Catheterisation of male and female bladder
☐	☐	A/18	Arterial puncture
☐	☐	A/19	Pleural aspiration
☐	☐	A/20	Closed chest massage / cardiopulmonary resuscitation
☐	☐	A/21	Sputum collection
☐	☐	A/22	Electrocardiogram
☐	☐	A/23	Measurement of blood pressure
☐	☐	A/24	Spirometry / peak flow measurement
☐	☐	A/25	Simple chest physiotherapy
☐	☐	A/26	Perform the surgical hand scrub
☐	☐	A/27	Prepare the skin for surgery
☐	☐	A/28	Tie surgical knots
☐	☐	A/29	Handle basic surgical instruments
☐	☐	A/30	Use local anaesthetic blocks
☐	☐	A/31	Close surgical wounds
☐	☐	A/32	Use the Ambu bag
☐	☐	A/33	Use of glucometer
☐	☐	A/34	Use of slit-lamp microscope
☐	☐	B/1	Pericardiocentesis
☐	☐	B/2	Tracheostomy
☐	☐	B/3	Liver biopsy
☐	☐	B/4	Kidney biopsy
☐	☐	B/5	Sigmoidoscopy and sigmoidoscopic biopsy of a lesion
☐	☐	B/6	Bone marrow aspiration and biopsy
☐	☐	B/7	Joint aspiration and injection
☐	☐	B/8	GI endoscopy (upper GI, ERCP, Colonoscopy)
☐	☐	B/9	Bronchoscopy
☐	☐	B/10	Coronary angiography / cardiac catheterisation
☐	☐	B/11	Common imaging procedures (eg Barium meal, barium enema, angiogra echocardiography, ultrasound, CT scan)
☐	☐	B/12	Insertion of chest tube
☐	☐	B/13	Lumbar puncture
☐	☐	C/1	Common ECG abnormalities
☐	☐	C/2	Blood gas and pH reports
☐	☐	C/3	Routine pulmonary function reports
☐	☐	C/4	Common electrolytic patterns for blood and urine
☐	☐	C/5	Common radiological isotope, ultrasonic and computerised axial tomogra scanning abnormalities
☐	☐	C/6	Common blood picture abnormalities
☐	☐	C/7	Common biochemical abnormalities (including routine profiles and specific or function tests)
☐	☐	C/8	Common plasma drug level reports

The Rural Experience

14. List three (3) advantages of having done your 6th year attachment in a rural setting.

15. List three (3) disadvantages of having done your 6th year attachment in a rural setting.

16. How would you describe the teaching facilities on your rural placement?

17. How would you describe the accommodation on your rural placement?

18. Describe any practical difficulties you encountered during your rural placement.

19. Have you lived in a rural area before? Yes No

Comments

20. How would you feel about working in a rural practice now?

21. Please raise any important issues that need to be addressed to maximise the value of rural placement to future students.

Thank you for completing this questionnaire

pendix VIII

THE UNIVERSITY OF ADELAIDE

SURGICAL PLACEMENTS IN PROVINCIAL HOSPITALS

Dear

I am currently undertaking a Master's thesis in the field of surgical undergraduate education and would be grateful if you completed the attached questionnaire relating to your rural surgical attachment in 1998. I hope that your career is progressing well and look forward to your survey responses.

With Regards

Martin Bruening
Department of Surgery

Question 1.

What is your current position? (eg training program etc)

Question 2.

Thinking back to your rural surgical attachment, on a scale of 1 to 10, what is your view of the usefulness of the clinical experiences gained in the rural placement compared to your city attachment? Much worse 1 2 3 4 5 6 7 8 9 10 Much better

Question 3.

How would you rate the practical experience of surgery during your rural placement?

Very limited 1 2 3 4 5 6 7 8 9 10 Very extensive

Question 4.

How would you rate the experience of other practical procedures during your rural placement? Very limited 1 2 3 4 5 6 7 8 9 10 Very extensive

Question 5.

How enjoyable did you find your rural placement?

Not at all enjoyable 1 2 3 4 5 6 7 8 9 10 Very enjoyable

Question 6.

Overall, how would you rate the level of supervision/teaching on your rural placement?

Very low 1 2 3 4 5 6 7 8 9 10 Very high

Question 7.

In terms of educational experience, how did the rural attachment compare to your city attachment? Worse 1 2 3 4 5 6 7 8 9 10 Better

Question 8.

In terms of teacher quality, how did the rural attachment compare to your city attachment? Worse 1 2 3 4 5 6 7 8 9 10 Better

Question 9.

Have you lived in a rural area before? Yes 1 2 3 4 5 6 7 8 9 10 No

Question 10.

How would you feel about working in a rural location now?

Not at all likely 1 2 3 4 5 6 7 8 9 10 Extremely likely

Question 11.

Did your rural attachment have any influence on your post-graduate career?

None 1 2 3 4 5 6 7 8 9 10 Entirely

Question 12

Would you ever consider returning to the location of your rural attachment to practise medicine? Not at all likely 1 2 3 4 5 6 7 8 9 10 Extremely likely

THE UNIVERSITY OF ADELAIDE
FACULTY OF MEDICINE

FINAL (SIXTH) YEAR ASSESSMENT FOR M.B., B.S. 1998

1. SUMMARY OF EXAMINATION PROCEDURES

1.1 PRESCRIBED COMPONENT SUBJECTS

The 1106 Final (Sixth) Year Examination for the M.B., B.S. consists of the following prescribed component subjects:

4686 Clinical Competence VI, incorporating:
- 4008 Medicine VI,
- 4857 Surgery VI, and
- 9950 Clinical Pathology VI

8958 Community Practice VI
6460 Paediatrics VI
4364 Psychiatry VI

1.2 DETERMINATION OF RESULTS

In order to obtain a pass in the 1106 Final (Sixth) Year Examination a student is required to obtain a passing grade in every component subject. Details of the requirements for a passing grade are listed in Section 2 below for each subject.

1.3 ORDER OF MERIT RANKINGS

1.3.1 For the Board of Examiners

In order that the Board of Examiners might identify the top achievers for the possible award of Honours and Prizes, an Order of Merit Ranking is constructed using the following subject weights:

Subject		Weight
4686	Clinical Competence VI	52.5%
8958	Community Practice VI	12.5%
6460	Paediatrics VI	22.5%
4364	Psychiatry VI	12.5%

1.3.2 For Internship Ranking

The Faculty, in conjunction with the School of Medicine of the Flinders University of South Australia, has to provide the South Australian Health Commission with a ranked list of students for the purpose of allocating internship places. This combined list is compiled by representatives of the two Medical Schools carefully integrating the Adelaide and Flinders Order of Merit lists.

This Faculty's Order of Merit list is constructed on the basis of student performance in the Fifth and Final Year Examinations with a weight of one third and two thirds being ascribed respectively for each Examination. The Faculty will not make this Order of Merit ranking public but a student

may obtain his or her rank from the Medical School Office on the morning of the Declaration Ceremony.

A student who, on account of failing a component subject, does not pass the Final (Sixth) Year Examination in December will not have an Order of Merit ranking albeit that the Board of Examiners may have offered an opportunity for supplementary assessment. The matter of an internship placement is taken up with the South Australian Health Commission when the student successfully completes the supplementary assessment.

1.4 ASSESSMENTS TO BE UNDERTAKEN BY ALL CANDIDATES

(a) During Student Internships/Externships

1.4.1 Ward assessments -Clinical Competence VI
-Paediatrics VI

1.4.2 General Practice Placement assessment
- Community Practice VI

1.4.3 Written assignments -Community Practice VI
-Psychiatry VI

1.4.4 Clinical examination -Paediatrics VI

(b) During the November Examination Period

1.4.5 Written Examinations

Clinical Competence
Psychiatry VI
Paediatrics VI

1.4.6 Clinical and Practical Tests

Clinical Competence VI
Community Practice VI- General Practice Assessment
Community Practice VI- Practical Procedure Assessment
Community Practice VI- Patient Management Interviews

1.5 TESTS WHICH CANDIDATES MAY BE INVITED TO UNDERTAKE AT THE DISCRETION OF CLINICAL DEPARTMENTS

Series A Vivas - Distinction/Prize Vivas

A1: Medicine
A2: Surgery
A3: Clinical Pathology VI
A4: Psychiatry
A5: Paediatrics

1.6 TESTS WHICH CANDIDATES MAY BE REQUIRED TO UNDERTAKE AT THE DISCRETION OF CLINICAL DEPARTMENTS

Series B Vivas - Redemption Vivas

B1: Clinical Competence (incorporates Medicine, Surgery, Clinical Pathology VI)
B2: Psychiatry
B3: Paediatrics
B4: Community Practice

2. EXAMINATION PROCEDURES

2.1 CLINICAL COMPETENCE VI (incorporating MEDICINE VI, SURGERY VI and CLINICAL PATHOLOGY VI)

These subjects are assessed in an integrated fashion. Component marks will not be generated except for the purpose of awarding Distinctions and Prizes.

Assessment will be based on performance in the wards and on the November written and clinical examinations.

2.1.1 Ward Assessments

Heads of Units will be responsible for the assessment of students during their 'internship' attachments in Medicine and Surgery. In completing the 'Internship' Assessment Form they will take into account the student's performance in the ward and on a formal observed long case assessment. Normally this will be undertaken during the last two weeks of the 'internship'.

TWO OBSERVED LONG CASE ASSESSMENTS ARE EXPECTED, ONE AT THE END OF MEDICINE GENERAL AND THE OTHER AFTER THE SURGERY ATTACHMENT.

The attention of assessors will be focussed on three areas: performance of the clinical examination; ability to synthesise and use information; and interpersonal and communication skills. Unsatisfactory performance on one or more of these components will constitute an unsatisfactory assessment.

Two unsatisfactory 'internship' assessments will entail a Series B (pass-fail viva). One unsatisfactory 'internship' may entail a Series B viva depending on performance in the tests of Clinical Competence at the end of the year.

Ward assessments will be available to be viewed in the Clinical Studies and Medical School Offices. Changes to the ward assessment will not be allowed once the assessment has been received in the Clinical Studies Office.

2.1.2 Written Examination
Monday, 9 November 1998

This 2 hour examination will consist of short answer and problem-solving questions. Some questions may be based on pictorial material. The emphasis will be on issues of practical clinical and clinicopathological importance, including relevant aspects of forensic medicine.

2.1.3 Clinical Test
Thursday, 12 November and Friday, 13 November 1998

Students are to undertake the test according to a roster which will be prepared by the Clinical Studies Office at the Royal Adelaide Hospital in mid-October. This 90 minute assessment will consist of a circuit examination emphasising clinical skills (including communication skills, history taking, physical examination) and the performance of practical procedures. It will also include the interpretation of common investigations and the evaluation of tissue specimens.

From collating the results of the above assessments a number of outcomes arise. These are set out in the table below.

Note: Students who fail to pass the subject 4686 Clinical Competence VI will be deemed to have failed the Final (Sixth) Year Examination. Supplementary examinations will not be granted in cases where a student has failed this component of the examination.

OUTCOMES OF CLINICAL COMPETENCE V1 ASSESSMENT

NUMBER OF UNSATISFACTORY "INTERNSHIP" ASSESSMENTS	NUMBER OF MARKS BELOW, ON, OR ABOVE COMBINED CUT-OFF-SCORE	OUTCOME
Nil	Top 10%	Distinction/Prize Viva
Nil	Cut off score and above	Pass
Nil	Not more than 2 below	Redemption Viva
Nil	More than 2 below	Fail
1C	2 or more above	Pass
1C	Cut off score and 1 above	Redemption Viva
1C	Below	Fail
2C	2 or more above	Redemption Viva
2C	Less than 2 above	Fail
3C	-	Fail

2.1.4 Series A1, A2 and A3 Vivas

Approximately the top 10% of students in the integrated examination of clinical competence (Medicine; Surgery; Clinical Pathology VI) will be invited to present for a viva by the Departments of Medicine, Surgery and Pathology. The aim of these vivas will be to assist in the determination of high distinctions, distinctions and prizes.

The vivas will be of 20-30 minutes duration. They will be conducted by a panel of departmental examiners.

2.1.5 Series B1 Clinical Competence Viva

The redemption viva will require students to take a history from and examine two patients under the observation of examiners from the Departments of Medicine, Surgery and Pathology. The students will be required to present these cases to the examiners and discuss their diagnosis, investigation and management.

2.2 PAEDIATRICS VI

The assessment for Paediatrics VI will consist of a student's performance in Paediatrics V contributing 40% of the final result and an assessment of Final Year performance contributing 60%. Assessment of Final Year performance in Paediatrics will involve a clinical examination (40% of total subject mark) and a written examination in the November Examination Period.

2.2.1 Clinical Examination (40% of total subject mark)

The clinical examination will be in Paediatric Medicine and Paediatric Surgery. The examination will take the form of an objective structured clinical examination. There will also be a long case presentation and assessment. Case evaluations during student internships will be incorporated in the clinical examination marks.

Borderline unsatisfactory students may be offered a supplementary examination at the end of each teaching block. Students who fail this and students who are classified as "very unsatisfactory" in the clinical examination will be directed to undertake a series B3 Paediatrics Redemption Viva in the November examination period.

2.2.2 Written Examination (20% of total subject mark)

Wednesday, 11 November 1998
The 90 minute written examination which will consist of problem solving questions relevant to Paediatric Medicine and Paediatric Surgery will be conducted in November on the same morning as the examination for Psychiatry VI.

2.2.3 Series A5 Paediatrics Viva

Students who achieve the highest scores in the assessment for Paediatrics VI may be invited to present for a series A5 Paediatric viva by the Department of Paediatrics. The aim of these vivas will be to assist in the determination of distinctions and prizes.

The vivas will be of 20 to 30 minutes duration. They will be conducted by a panel of Departmental examiners and will employ a structured format.

2.2.4 Series B3 Paediatrics Vivas

Students who have:

been classified as very unsatisfactory in the clinical examination at the end of the teaching block

or

performed inadequately in the written examination in the November examination period

or

have achieved a total mark for Year V and Year VI of below 50%

will be directed to present for a Series B3 Paediatrics Redemption Viva.

The viva will be conducted by members of the Department of Paediatrics and its clinical and/or theoretical format will be based on the nature of a student's unsatisfactory performance.

2.3 PSYCHIATRY VI

To pass Psychiatry VI a student has to obtain a passing grade in a Written Examination, Essay and a Clinical assessment.

2.3.1 Written Examination (40% of subject mark)
Wednesday, 11 November 1998

A 1 hour Psychiatry examination in which a student will be required to answer three (3) out of five (5) essay type questions is conducted in conjunction with the examination for Paediatrics VI.

2.3.2 Assignment (20% of subject mark)

The Department of Psychiatry will indicate topics for the essay which should be submitted on the last Friday of the four week course.

2.3.3 Log of Cases (20% of subject mark)

In order to evaluate patient contact, students will be required to document their clinical experiences. Further details on this part of the assessment can be obtained from the Department of Psychiatry.

2.3.4 Clinical Assessments (20% of subject mark)

Assessors will make a clinical assessment of a student's performance at the end of the attachment to a Psychiatric Unit.

2.3.5 Series A4 Psychiatry Viva

Candidates achieving the highest scores in Psychiatry will be invited to present for a Series A4 Psychiatry Distinction/Prize Viva in the Department of Psychiatry.

The Vivas, which will be of about 20 minutes duration, to be conducted by a panel of departmental examiners will involve the viewing and discussion of short segments of video-taped material.

2.3.6 Series B2 Psychiatry Viva

Candidates whose assessment in psychiatry is unsatisfactory will be required to present for a Redemption Viva. The Redemption Viva will be of about 20 minutes duration and will involve the viewing and discussion of short segments of video-taped material.

2.4 COMMUNITY PRACTICE VI

2.4.1 General Practice Placement Assessment

General Practitioners will assess the students' performance during their placement. They will take into account the students' consulting skills, knowledge and behaviour during the attachment.

The Community Practice mark will be constituted as follows:

2.4.2 Communication and Management - 40% of subject mark

Two Patient Management Interviews with a standardised patient, each to count for 20%. These are primarily to be an assessment of advanced communication and consulting skills.

Students will be rostered by the Department of General Practice to attend during the formal examination period.

2.4.3 General Practice Assessment: Thinking in Practice - 30% of subject mark

A "log-diary" of six short summaries of cases seen during the rural or city attachments to be completed during general practice attachments. This will count for 10% of the subject mark. A structured diary for their recording will be provided to students. The summaries are to be brief, in point form and concentrate on reasoning and decision points. They are not to be a lengthy review of the medical condition.

A twenty minute discussion of points from the case summaries with two examiners, one of whom will be an experienced general practitioner and one a health worker with a background in public health, will be conducted during the week16 - 20 November. This will assess the student's ability to formulate and discard hypotheses, to respond to uncertainty and ambiguity and to choose appropriate tests, referrals and services, rather than a detailed examination of knowledge of the patient's medical condition. Students will be rostered by the Department of General Practice.

2.4.4 Practical Procedure Assessment - 10% of subject mark

A test of the student's ability to perform two practical procedures. The student will spend ten minutes at each of two "stations" at which he/she will be required to perform one of the procedures taught during the teaching workshops and practised in the general practice attachments. Students will be rostered by the Department of General Practice.

2.4.5 Public Health Modules - 10% of subject mark

10% of the overall assessment in Community Practice VI will be based on the public health segment. The assessment will be based on participation (which will include the satisfactory completion of specific in-class activities) in each of the 3 modules (health care delivery to aboriginal people, domestic violence and occupational medicine). The details are set out in the relevant handbooks.

In addition, students are expected to address public health issues in their log diary, and the Thinking In Practice Assessment will also include public health issues from cases in their log diary.

2.4.6 Integrated and Coordinated Care - 10% of subject mark

This section draws on the experience of coordinating the care of a complicated patient. The written assessment is a short summary of the themes identified and a critical analysis of the options for the future.

2.4.7 Series B4 Community Practice Viva

A student whose marks and/or clinical ratings are deemed inadequate may be directed to undertake a Series B4 Community Practice Redemption viva examination to be conducted by a panel of examiners appointed by the Departments of General Practice and Public Health.

The clinical and/or theoretical format of the viva will be based on the nature of a student's unsatisfactory performance.

3. NOTES RELATING TO WRITTEN EXAMINATIONS

3.1 It is necessary that you bring your Student Identification Card to all examinations and you are asked to place it on the top right hand corner of your desk to facilitate the attendance check undertaken by the examination invigilator.

3.2 Read carefully and comply with instructions given in relation to respective sections of the papers. Failure to do so can lead to lost papers.

3.3 Timetables

The times listed above are those that the Faculty of Medicine will request for 1998 but the Official Timetables for the November examinations will be published by the Examinations Office of theUniversity. It will be the responsibility of students to ascertain the dates, times and venues from that publication in due course.

NOTE: Special arrangements will not be made for students who mis-read the examination timetable.

4. DETERMINATION OF RESULTS

The Board of Examiners will meet to review the results of all students. Classified results (ie High Distinction, Distinction, Credit, Pass, Fail) shall be awarded for all component subjects of the Final (Sixth) Year Examination and a Non-graded Pass/Fail result shall be awarded for the overall Examination.

The Board of Examiners shall recommend the award of the degrees of Bachelor of Medicine and Bachelor of Surgery (with Honours). In making its recommendation the Board will consider candidates whose results in the Third Year, Fourth Year, Fifth Year and Final (Sixth) Year Examinations have been adjudged to have been of distinguished merit.

The cases of students who have not passed the Final (Sixth) Year Examination will be considered by the Board of Examiners. It may prescribe additional study and/or clinical work to prepare a student for a supplementary examination which may be offered on academic, compassionate, medical and mixed grounds. However, a student who fails Clinical Competence VI will not be offered a supplementary examination.

In accordance with a University policy, the maximum result obtainable for a supplementary examination awarded by the Board of Examiners on academic grounds shall be 50% pass. On the other hand the results of supplementary examinations awarded on compassionate, medical and mixed grounds shall continue to be classified.

5. HANDWRITING

It is the student's responsibility to submit work for assessment which is legible. Marks can only be awarded where an examiner can read what a student has presented. This is of particular concern with respect to examination scripts because there are no opportunities for a student to rewrite or type them.

5. CONTACT ADDRESS AND TELEPHONE NUMBER

It is important that your address and telephone number are kept up to date in the University's Student Information System. This is particularly so around the examination period because the Faculty Office or a department may have to contact you about a viva examination.

ADMISSION TO DEGREE - 1999

In the event that you successfully complete the requirements of the Final (Sixth-Year) Examination this year you will need to formally apply to be admitted to the degrees of Bachelor of Medicine and Bachelor of Surgery at the University Commemoration Ceremony in April/May 1999. If by mid-November you have not received an application form from the Student Administration Branch, please make enquiries with the Examinations and Commemorations Office.

8. AUTHORISED STATEMENTS CONCERNING EXAMINATION REQUIREMENTS

The procedures and arrangements for the 1998 Final (Sixth) Year M.B., B.S. Examination, approved by the Board of Examiners, are as set out in this document. Any variation in these procedures will be notified in writing. No other statements or information concerning the examination will be recognised or acted upon by the Board of Examiners.

D.B. FREWIN
DEAN
CONVENOR
SIXTH YEAR, M.B., B.S.
BOARD OF EXAMINERS

February 5, 1998
ILC:vk/WORK:ASSESSMENT PROC.96:ASSESS PROCED-6TH 98
VK: Sixth Year Assessment 1998

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