EDUCATION AND TRAINING

CURRENT TRENDS IN UNDERGRADUATE MEDICAL EDUCATION: Program and Curriculum Design

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Note: This is the first of two articles for the Samoa Medicine Journal on undergraduate medical education. This article looks at program and curriculum design, the second focuses on teaching, learning and assessment methods.

Abstract

Medical education has changed in focus and methodologies since its early beginnings and more recently has become more professionalized and community-oriented. This article considers some of the current international trends in undergraduate medical education in program design, curriculum structure and student selection, exploring their relevance to the South Pacific context.

Introduction

Medical education has a long history, from early beginnings where unregulated apprentice-based learning and barbershop surgeons were the norm, through the establishment of free-standing autonomous medical schools from the 12th century onwards, to the current situation where most medical schools are embedded in large multi-faculty universities and subject to regulations from funding bodies and professional and statutory bodies responsible for regulating doctors. However, this western model is not always appropriate for developing countries, for countries with indigenous populations upholding traditional health practices and for rural and remote areas of the world.

Undergraduate medical education does not exist in a vacuum. Programs and the medical schools or universities that develop, manage and deliver education are constantly responding to external and internal change drivers. There are inherent tensions in trying to deliver an elite, highly skilled segment of the health and social care workforce amidst calls for more dispersed clinical leadership, flatter health structures, more community-based and preventive healthcare and moves to collaborative practice, interprofessional working and learning and more integrated public services.

Medicine, as a profession, has also been subject to increased scrutiny and regulation not only as a result of greater accountability for public services and public spending but also due to a number of high profile cases involving ‘failing doctors’. Many of the concerns expressed by medical educators reflect the need for medical curricula to prepare doctors not only who are safe to practice, knowledgeable and competent, but who also have the appropriate professional attitudes and are willing to work towards improving health systems.

This article takes an international perspective (looking primarily at Australia, New Zealand, the UK and Canada) in considering some of the current trends in undergraduate medical education in program design, curriculum structure and student selection, exploring their relevance to the South Pacific context.

Workforce needs and medical education

In many countries around the world, including the South Pacific, there is a pressing need for more doctors in the right place, at the right time, with the right skills, providing the right care. Many countries have increased the number of medical graduates over the last two decades, primarily in response to increasing populations, changing demographics and shifting workforce trends. A particular issue is addressing shortages in rural, regional and remote areas and to encourage recruitment and retention amongst certain sectors of the population, such as indigenous or under-represented groups. Increasing medical student numbers has resulted in four main responses by universities and governments:

- Establishing new medical schools in areas of previously underserved populations
- Allocating additional numbers to existing schools for existing programs
- Allocating additional numbers to existing schools to develop and introduce new programs, quotas or establish clinical or urban schools in rural, remote or regional areas of deprivation or health need
- Supporting affirmative action schemes and programs for groups under-represented in medicine
In the South Pacific, in addition to Islanders being awarded scholarships to study medicine in Fiji, New Zealand and Australia, the establishment of Oceania University of Medicine (OUM) in Samoa has provided another means of increasing medical student numbers of local residents. Some writers have suggested that taking narrow, health service based approaches to workforce planning stifles both innovation and capacity for change, and a reliance on a primarily medical workforce to deliver care that can be delivered by other health or social care workers is short sighted. It has been suggested that more attention should be paid to formalizing roles of community health workers, mid-level health workers or ‘physicians assistants’, particularly in areas where primary care, public health and preventive services need to be strengthened. Other ways of looking at the health workforce are also important, extending the scope of practice for health professionals, physician’s assistants, nurse consultants and dually qualified practitioners must be taken into consideration when planning the future of the medical workforce and the underpinning education and training requirements.

Entry requirements and selection criteria

Increasing attention is being paid to how and from where medical students are selected. In common with the South Pacific scholarship program, Australian medical schools have specific streams (supported by scholarships and tied into bonding arrangements) for students from rural and remote areas. In Australia and New Zealand affirmative action programs are well established for indigenous groups (Aborigine, Torres Strait Islanders, Māori and Pacific groups) and for students from rural regions. Evaluation of medical programs in Australia indicates high long term retention of doctors. However the long term success of programs aimed at addressing workforce need through expanding and reshaping undergraduate medicine is still to be determined and issues remain around attracting doctors to work in such areas. As Prideaux and others note, the other side of the solution is around policies and strategies for workforce planning, noted by many to be a hugely difficult problem particularly with a global and increasingly mobile health workforce.

Students entering a five or six year program are usually school leavers, graduates with a degree that is not deemed relevant for graduate entry or graduates with a relevant degree (e.g. in Biosciences) but where a Graduate Entry Program (GEP) is not on offer (e.g. in New Zealand). Entry requirements are usually high as there is great competition for places, typically between 12 and 20 applicants per place.

Selection for medical school in most countries is through a combination of measuring academic achievement at secondary school or university (e.g. through NCEA results, secondary school certificate, baccalaureate or A-levels); the ‘open space’ in the application; referees’ report and interview. In New Zealand and Australia, applicants also take the UMAT (Undergraduate Medical and Health Sciences Admissions Test) which is a test administered by the Australian Council for Educational Research (ACER) to assist in the selection of students into certain health science courses including most medical (MBBS or MBChB) and Dentistry (BDSc or BDS) courses, physiotherapy and pharmacy.

Interviewing is often used as part of the selection process for medicine, although as McManus and Powis observed ‘selection sometimes seems more to ensure the correct number of entrants on day one, than to identify those best suited to the course and profession … the University of Adelaide recently reduced its emphasis on selection interviews, the University of Queensland may be ending interviews and a meta-analysis in Medical Teacher suggested that selection interviews have only a ‘modest’ predictive validity and ‘little’ or ‘limited’ practical value’ (p1).

Multiple mini interviews (MMIs) are increasingly common in medical interviewing. Here, applicants move round ‘stations’ or tables and answer questions or discuss issues relating to various topics, including ethical issues, career choices, motivation for studying medicine and previous work experience. The responses are scored against criteria, often by two interviewers. MMIs replicate the OSCE (Objective Structured Clinical Examination) in that after all applicants have completed the stations, the scores and comments are fed back and collated. The interview scores are then aggregated with other application data so that decisions can be made on who should be offered a place.

Special arrangements exist in New Zealand and Australia for students from indigenous and rural backgrounds. At Auckland University for example, the MAPAS (Maori and Pacific Islanders Admissions Scheme) and ROMPE (Rural Origin Medical Program Entrants) are positive or affirmative action programs which provide quotas for students from these backgrounds, plus additional entry and support mechanisms. Most medical programs also include a quota (typically 10%) for international students, some of whom will be on study scholarships; others will be full fee paying students.
Key trends in medical education

Medical education, like other subject disciplines, is subject to trends and shifts in philosophy, which represent responses to workforce and service demands, opportunities and advances in learning and scientific technology and the development and maturation of ‘medical education’ as a discipline. Medical education now reflects the input and influence of a range of approaches to research, teaching and learning drawn from a wide range of disciplines outside the traditional sciences, including education, psychology, sociology, linguistics and other humanities. It is an exciting time to be involved in medical education and there are many examples of new medical programs and medical schools that are not modeled on traditional lines.

Two key shifts that are reflected in the South Pacific medical programs are those towards graduate entry medicine programs (GEPs or GEMs) and community-based medical education. Many countries (including Australia, Canada, UK and Ireland, but also in the US, South Africa, South America and across Europe) now include GEPs alongside traditional five or six year programs for school leavers. GEPs provide a route for qualified health professionals or graduates from science or related disciplines to take a shorter (typically four year) medical program. Studies looking at the ‘outputs’ of graduate entry programs compared with traditional programs indicate (although GEP programs are no panacea) a higher academic performance of GEP students (especially those with science degrees or health professions degrees) and that GEP students report a valuable learning experience.

Community based education, where most of the clinical teaching is located in the community (general practice, community clinics, small health centers and hospitals) is seen as a particularly relevant way of encouraging and supporting medical students to become GPs or practitioners in medical specialties in rural, regional and remote areas. Wollongong (a new Australian school) has planned a community based medical school based on a UK model. Here 80% of the teaching will take place in community settings; this has required establishing and developing strong links with local health service providers. This new program caters for a relatively small number, between 25 and 50 entrants per year, of graduate entrants. It reflects workforce and service needs and aims to produce graduates who have the commitment and expertise to work alongside other professionals in areas of need for some or all of their subsequent careers.

There is widespread illustration in practice that new medical schools do not need the full range of resources available that an established medical school would have. Lawson et al describe how the new Australian schools had ‘the luxury of first choosing the curriculum and then devising the best way to deliver it, unlike older schools which had to impose new courses onto pre-existing structures’. In common with OUM, the new Australian and UK schools have a focus on integration of disciplines, they tend not to set up traditional departments and expect to draw from resources both within and outside the university, where necessary forming collaborations with other institutions locally, nationally and internationally.

There are real opportunities in the South Pacific, because of the small size of the islands, for enabling medical students to learn and work alongside other health and social care students from the beginning of their program, so as to produce graduates who are truly able to work in interprofessional teams. Existing expertise in health professions’ education, strong relationships with academic and health providers and a range of collaborative activities provide an invaluable resource and vision for what could be achieved regionally.

Curriculum design

Worldwide, there are now two main curriculum models for undergraduate medical education, although within these overarching models there are a range of educational options. The two models are:

- a five, six or seven year ‘traditional’ program, primarily for school leavers
- a four year ‘graduate entry’ (GEP) program (sometimes slightly longer) for graduates or qualified health professionals

Successful completion of either of these medical programs leads graduates to professional registration, although the immediate postgraduate period of training differs between countries. Many ‘traditional’ programs, particularly in the UK, also include opportunities for an intercalated degree, typically a BSc, although some universities offer a Masters or PhD program for selected students. An intercalated bachelors’ or masters’ degree usually requires an additional full time year of study.

Graduate entry programs

Graduate entry programs are relatively new and began in Canada and Australia. The first was a pioneering problem based learning (PBL) course that began at Newcastle University, Australia in
the 1980s. The terms are generally used outside the USA to differentiate from the traditional programs for school leavers, referring to medical programs (usually of 4 years duration) where applicants are university graduates or registered health professionals. Although the courses are typically four years in length, it should be noted that most have extended terms/semesters and years throughout (e.g. 38 - 42 learning weeks) to meet initial registration requirements.

Some specific GEPs have been established to allow ‘conversion’ or dual registration, specifically in areas where highly specialized skills are required or where there are other workforce needs. One example is the MBBS ‘Medicine Max Fax’ course at Kings College London which is designed to enable a small number of dentists registered with the UK’s General Dental Council to ‘fast track’ to a medical degree. Some GEP programs also enable health professionals to ‘convert’ to medicine, even if they do not have a degree, as long as they satisfy admission requirements.

In Canada, all programs are GEPs, with the majority being four-year programs. Exceptions include McMaster University and the University of Calgary where programs run for 3 years, without interruption for the summer. In the Canadian GEPs, the first half of the medical curriculum is dedicated mostly to teaching the basic sciences relevant to medicine, such as anatomy, physiology, pharmacology, genetics, microbiology, ethics and epidemiology, which may be organized by discipline or by organ system. The remainder of medical school is spent in clerkship. Typical rotations include internal medicine, family medicine, psychiatry, surgery, emergency medicine, obstetrics and gynecology and pediatrics. Elective rotations provide opportunities for students to explore specialties of interest for residency training. Some medical schools offer joint degree programs in which a limited number of interested medical students may simultaneously enroll in MSc or PhD programs in related fields. Often this research training is undertaken during elective time and between the basic science and clinical clerkship halves of the curriculum.

In schools which already had established five/six year curricula, the majority have woven the GEP curricula and students into the established course. So, for example, at Kings College London, the first year is unique to the course but for the last three years of this course, students join those of the other MBBS streams for a common course. The core curriculum is covered in the first three years and the fourth year is vocationally oriented and includes the opportunity to study abroad for an elective period. Curriculum design, balance of clinical and ‘academic’ learning, teaching and learning methods and assessment all very much reflect both the dominant trends of the time, the national policy and funding arrangements, the local healthcare context and the internal management and organizational structures. In many western countries it is clear that there has been significant shift towards acknowledging the responsibilities of medical schools in addressing workforce shortages.

Prideaux suggests however that there has been ‘less attention in the literature about the influence of national and local contexts despite the influence of governments all over the world in addressing workforce shortages through the outcomes of medical education programs’ (p300). This is an area of potential further research in the South Pacific.

New models of higher education

Many universities offer a common first year (or Foundation year) to students wishing to enter health and science programs. Some select students for each of the programs prior to entry to the first year and offer an inter-professional learning program (such as the New Generation project at Southampton University, UK) and others (such as at Auckland and Otago universities in New Zealand) offer a common first year, after which, students are selected for entry to the various programs.

Recently, most notably in Australia, North America and Europe, new models of tertiary (higher) education are being introduced for professional degrees based on broad based undergraduate degrees leading to employment, a professional graduate degree or a research degree such as a PhD. The most widely known in Austrasias is the ‘Melbourne model’, introduced at Melbourne University in 2008. Nursing moved to the graduate level in 2008, medicine moves in 2011, with a radical shift in structure. As the University moves to the Melbourne model, the six year MBBS/BMedSc degree and four and a half year GEP degree (MBBS) will be phased out and replaced with a new four year postgraduate degree, the Doctor of Medicine (MD) which will begin in 2011.

Curriculum design and preparedness for practice

The design and delivery of undergraduate medical curricula and teaching, learning and assessment methods have much in common with those of other health professions. However, partly reflecting the way in which the profession was established and also the ‘scientific’ nature of medicine, the culture of medical education in-
volves recognizing some specific trends and unique ‘ways of working’.

Over the last decade, accrediting and registration bodies have placed increasing focus on and scrutinized undergraduate medical curricula in response to high profile cases involving doctors. The UK GMC, for example, (which often sets the scene for other accrediting bodies worldwide) in its recent iteration of *Tomorrow’s Doctors 2009*¹¹, places huge emphasis on ‘the doctor as a professional’ which includes learning outcomes relating to professional behaviors, ethics and law. *Tomorrow’s Doctors* is the document that comprises the GMCs recommendations on undergraduate training which all UK medical schools are appraised against in the quality assurance process (see below). It is of equivalent status to the AMC’s Standards and procedures for the assessment and accreditation of medical schools¹². The GMC¹³ commissioned research in 2007-2008 to investigate ‘preparedness’ for practice of graduates from three medical schools with different curricula: Newcastle (systems based, integrated, five-year program, school entry); Warwick (graduate entry, four year program) and Glasgow (Problem-Based Learning (PBL) curricula, five year, school entry). The research found little difference between the preparedness of graduates between the schools, ‘there was a suggestion that Glasgow graduates were more confident about seeking information, possibly related to the PBL course, and that graduate entry graduates were more confident in complex communication, due to their age and relative maturity. However these may be attributions based on expectation, and there is no strong evidence that graduates do differ in their behaviour.’¹⁴ (piii).

What the research did reveal, however, were some areas where it was deemed all graduates were less well prepared, specifically arriving with not enough ‘on the job’ experience (although they got up to speed very quickly) and prescribing. ‘Weaknesses were identified both in the pharmacological knowledge underpinning prescribing, and the practical elements of calculating dosage, writing up scripts, drug sheets, etc’¹⁵(piii). The report recommended to the GMC that medical schools should aim to ensure clinical placements with more structure and consistency, with more experiential learning across specialties, that graduates ‘shadow’ the junior doctor job they are moving into and that more attention is given to supporting the development of ward-based teaching of prescribing as a skilled procedure.

**Vertical and horizontal integration**

Historically, medical programs comprised a two-year ‘pre-clinical’ course which focused on the biological and natural sciences (taught in a university setting), followed by a three year ‘clinical’ apprenticeship style course, largely located in hospitals. This model is still found in many countries today and remnants of the model exist in many ‘traditional’ programs where students are taught the (mainly) science building blocks prior to applying this knowledge in clinical practice. A pre-clinical course typically includes anatomy; physiology; biochemistry; pathology and pharmacology, plus some medical sociology, psychology and ethics/law. A typical ‘clinical’ course would include students being allocated to a series of clinical attachments to gain experience of the major medical specialties. Students would take general medicine and surgery (probably in the third year and possibly again later), then move onto sub-specialties such as Neurology; Endocrinology; Gastro-intestinal medicine/surgery; Obstetrics and Gynecology; Pediatrics; Genito-Urinary Medicine, and Psychiatry. They would also work in General Practice and Accident and Emergency Medicine. Most medical programs also include an ‘elective’ or ‘selective’ (depending on country) where students choose to work in a different context, often another country, for a period of five to ten weeks.

In the last twenty years, there have been increasing pressures on medical educators for curriculum reform, and as a consequence we have seen the decline of the traditional pre-clinical/clinical model. As medical science developed and the extent of knowledge increased (particularly around molecular biology), growing concerns were expressed about the volume of knowledge in medical curricula and the ‘increase in factual overload’¹⁶. The temporal and geographical separation of course ‘content’ from clinical practice was also highly criticized in the light of developing understanding of student learning, and, as situational models of learning became more influential¹⁶, there was a shift in medical curricula towards more integrated, descriptive curriculum models¹⁷.

In many countries, the traditional approach has largely been modified towards a more integrated approach to curriculum planning and design. An integrated approach is still subject centered but transcends the traditional subject boundaries. Teaching units from subject disciplines are fused together around meaningful organizing themes/concepts such as body systems or community medicine. In medical education the term ‘vertical integration’ describes the blurring of
FROM FLEXNER TO HARDEN\textsuperscript{19}  

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<tr>
<th>Flexner (1911)</th>
<th>Harden (1984): the SPICES model</th>
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<td>Teacher-centered</td>
<td>Student-centered</td>
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<td>Knowledge giving</td>
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<td>Discipline led</td>
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<td>Electives (+ core)</td>
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boundaries between pre-clinical and clinical courses whereas horizontal integration describes how knowledge and skills from many disciplines are clustered around themes such as body systems (e.g. a cardiovascular systems course might include anatomy, physiology, biochemistry, pathology, clinical medicine, sociology, epidemiology, etc. relating to the cardiovascular system). The consequences of these shifts led to curricula being reviewed and reformed so that students gained early clinical experience and ‘scientific’ learning extended into the clinical years. Medical educators described the shift from the traditional model described by Flexner in 1911 to curricula that were based round the SPICES model\textsuperscript{18}, see below.

The spiral curriculum model was often used as the basic curriculum model, rather than the pre-clinical/clinical model, with many programs being based around body systems (a systems-based approach) and clinical placements, with more emphasis on a structured curriculum, based on learning, reinforcement and application of learning. ‘The medical curriculum should be designed so as to provide adequate opportunities to acquire independent learning skills, while developing clinical competence to a level appropriate to a new pre-registration house officer. Experiential learning arising from extensive periods of direct patient contact is an essential component of the course, which may be supported by contributions made by skills laboratories and learning activities using simulated patients. Adequate numbers of patients in primary, secondary and tertiary care settings need to be available for face-to-face student contact’\textsuperscript{20}(p9).

Measures were also put in place to try to reduce the emphasis on learning facts. Outcome-based education, OBE\textsuperscript{21}, was suggested as a way of defining and structuring medical curricula, and, although debate in medical education over objectives, outcomes and competencies still exists, there is now general consensus (also influenced by wider higher (tertiary) education quality assurance mechanisms) that curricula should be defined in terms of what students and graduates should be able to achieve at various stages of the program\textsuperscript{22, 23}. The UK Quality Assurance Agency (QAA) for example, sets Subject benchmarks in all subject disciplines offered by UK universities, including medicine. The Medicine benchmark statement\textsuperscript{20} includes broad learning outcomes that graduates should achieve by the end of the medical program, including outcomes defined by the GMC in terms of professional attributes.

Although the traditional approach has often been criticized for separating the underpinning ‘science’ from clinical medicine and which many people feel is best learned in a clinical context, it is often easier to develop and deliver a traditional course within the structure and organization of established medical schools. Many medical schools are divided into clinical and non-clinical departments and on a practical level, integration can often be difficult to achieve. Barriers such as physical separation, funding mechanisms and inter-departmental rivalries are often difficult to overcome. Many new schools have been able to take advantage of a lack of ‘history’ and establish curriculum management and internal funding arrangements more consistent with the needs of delivering a modern, integrated medical curriculum.

The ‘Symbiotic’ Curriculum and Community Engagement

One feature which has changed significantly over time is where students acquire their clinical skills and professional behaviors. In the ‘traditional’ pre-clinical/clinical programs, students were primarily based in hospital (typically large teaching hospitals) settings, where they undertook fairly unstructured, apprenticeship style placements where they were allocated to a consultant and his/her team (a ‘firm’) for a specified length of time. These placements were variable in quality and students were not necessarily learning the same things or the right things for their future medical practice. The implementation of more robust and standardized quality assurance and enhancement mechanisms requires that increased attention is paid to ensuring that the clinical learning experiences are a more standardized experience, that they are structured, have specific learning outcomes, are assessed and are of appropriate quality.
Another way in which medical curricula have responded to the challenge of extending learning into the community is through a ‘symbiotic’ curriculum design as part of the PRISMS model (see above).

The PRISMS model reflects some of the worldwide trends in medical education; however the idea of the ‘symbiotic’ curriculum (with partnership with communities and a shift of location of clinical teaching) has been a slightly separate and highly influential model in many medical schools, predominantly in Australia, Canada and the UK. In response to increased awareness of the impact of the medical curriculum on both student learning and community based healthcare, the Australian government provided a special grant as part of a comprehensive rural medical workforce strategy.

Recent research has established that rural community based clinical education is built on four fundamental relationships:
1. A personal - professional relationship
2. A clinician - patient relationship
3. A university - health service relationship
4. A government - community relationship

The student is located at the centre of these relationships, see Figure 1 below. Evaluations of the PRCC program have been very positive. Students are not academically disadvantaged in terms of passing common examinations and assessment. Advantages to the PRCC program include an increasing independent style of learning, enhanced clinical skills as students learn to deal with ‘what comes through the door’

Key features of the PRISMS model

**Product focused** - i.e. practice based linked with professional development. Students learn about basic science by applying it in the clinical context

**Relevant to students and communities** - reflecting the needs of local health communities as well as student learning needs

**Inter-professional** - programs will espouse, encourage and reflect a culture of multi-professional learning, collaboration and teamwork

**Shorter courses taught with smaller numbers** of students on each ‘unit’ (placement, learning set, group). This also reflects the worldwide shift towards graduate entry programs and need to better integrate undergraduate education with postgraduate training

**Multisite locations** - shift from large teaching hospitals with restricted patient mix to primary care and smaller hospitals and units. This incorporates the shift to a more immersed learning experience, especially in community settings so that students can establish closer relationships with patients and health colleagues essential for contemporary medical practice

**Symbiotic (organic whole)** - this is the link with the prism where clinical education is the driving force, partnerships between communities, medical schools, learners and teachers are important and medical education becomes part of an increasingly diffuse and dynamic health system where health care is only one part of the wider public service agenda.

Flinders University (Adelaide) in 1997 as a stream for 3rd year students within the 4 year graduate entry program. The program was established with the aim of addressing “the twin issues of workforce maldistribution and the inappropriate urban tertiary teaching hospital caseload” (p559). The Rural Clinical School (FURCS) manages the rural programs which now include programs for nurses and paramedics, a clinical simulation centre (in Renmark) and Community point of care services. Medical students spend the whole year (immersion program) located in one of four rural centers, learning from general practitioners, other health professionals and patients. Videoconference links provide communication and teaching media and there is a well established program of research, teaching and professional development activities, including a Masters in Clinical Education.

An example of community engagement and the symbiotic curriculum that has been well evaluated and researched is the Parallel Rural Community Curriculum (PRCC) which was established at Flinders University (Adelaide) in 1997 as a stream for 3rd year students within the 4 year graduate entry program. The program was established with the aim of addressing “the twin issues of workforce maldistribution and the inappropriate urban tertiary teaching hospital caseload” (p559). The Rural Clinical School (FURCS) manages the rural programs which now include programs for nurses and paramedics, a clinical simulation centre (in Renmark) and Community point of care services. Medical students spend the whole year (immersion program) located in one of four rural centers, learning from general practitioners, other health professionals and patients. Videoconference links provide communication and teaching media and there is a well established program of research, teaching and professional development activities, including a Masters in Clinical Education.

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and increased confidence with patients. Concerns over the ability of General Practitioners to teach were soon dispelled and the high volume and case mix meant that students are able to manage and treat a much wider variety of patient problems than in the tertiary setting.

Student groups are small, this is one of the main benefits to the learning process however the program is expensive to run in terms of having to establish facilities, train and support teachers and maintain communications. In common with many other countries (e.g. the US, at the Universities of New Mexico and Minnesota; UK, at the universities of Cambridge, Durham and Newcastle) the Australian government recognizes the benefits of rural based programs which embrace community-based education. The Flinders curriculum has been utilized by a number of schools across the world as the basis for new medical program development.

In New Zealand, clinical schools have been established in various regions attached to both medical schools. These schools aim to provide a hub for teaching and learning for clinicians, academics and students. At the University of Auckland, a new program, the Pūkawakawa program began in 2008 for 5th year medical students, designed to maximize the strengths of Northland healthcare opportunities to enhance student learning in communities’ environments and multidisciplinary teams, while ensuring students meet equivalent learning outcomes and common end-of-year assessments with the standard program. The program was designed on the ‘hub and spoke’ model that has been successfully introduced elsewhere and has many similarities with the Flinders program described above. The ‘spokes’ allow accul-turation of students into rural community living and to learn what rural medicine entails. The principles of a symbiotic curriculum have been strongly embedded in the experience, and the design and implementation of Pūkawakawa meets the essential features of theoretical models of community engagement. Early evaluation of the program drawn from focus group interviews and the year 5 assessment results showed that students on the Pūkawakawa pathway have a similar academic performance to the standard Year 5 pathway. There were also encouraging outcomes for students who were Māori. Follow up studies planned will look into “Student Preparedness for Year 6” and their ultimate career destination.

Conclusion

This article has considered some of the current trends in program and curriculum design, locating these within requirements for medical schools to consider the needs of and engage with local communities. Undergraduate medical education plays a key role in equipping the health workforce with the doctors that it requires and the way in which the curriculum is designed and structured is immensely influential. Medical curricula need to be dynamic and responsive to external influences and changes if they are to ensure that the doctors of the future have the knowledge, skills and attitudes required by the communities which they serve. Medical curricula also need to emphasize current concerns about doctors’ performance including professionalism, concerns for patient safety and a drive towards continuous quality improvement in health care.

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