

SURGICAL EDUCATION

PROGRESS OF SURGICAL TRAINING IN PAPUA NEW GUINEA TO THE END OF THE 20TH CENTURY

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Background: Health care in Papua New Guinea (PNG) throughout the 20th century has been characterized by a significant shortage of medical practitioners and surgical expertise. A number of initiatives within the country and from outside have sought to address these deficiencies of numbers and quality. The present paper seeks to review the development of surgery and surgical training in PNG.

Methods: Review of the surgical literature, reports and records in the Division of Surgery at the University of Papua New Guinea (UPNG), and personal observations are used to look critically at the content and productivity of the various training initiatives.

Results: For the first half of the century, PNG relied on national medical assistants who were trained, supervised and directed by expatriate doctors. Medical training of PNG doctors began in 1951 and by 1999 more than 600 doctors had graduated. Expatriate specialist surgeons arrived in 1950 and were the only surgeons until the postgraduate Master of Medicine (surgical) programme produced its first graduates in 1978. This programme has now produced 37 surgeons who are reasonably well distributed throughout the country. Higher surgical diplomas were introduced in 1994 for more specialized training of some of the general surgeons. These training developments have been supported by AusAid as well as by Australian surgeons.

Conclusions: Surgical expertise has progressively improved throughout the 20th century with the most major advances being achieved in the last decade. Training programmes have provided an expanding core of expertise of considerable quality, but the numbers of doctors and surgeons remain well below requirements.

Key words: developing countries, medical education, Papua New Guinea, surgical training, tropical medicine.

INTRODUCTION

The present article aims to review the development of surgery, surgical training and surgical facilities in Papua New Guinea at the dawn of a new millennium. It takes a bird's eye view of medical training in the past half century and specifically assesses the development of surgery in the past decade.

EARLY TRAINING OF MEDICAL ASSISTANTS

In 1884 Germany annexed New Guinea and Britain created a Protectorate for Papua which became an Australian administered territory in 1906. After World War I Australia was given a mandate by the League of Nations to administer New Guinea. Thus until World War II Papua and New Guinea were administered as separate regions. The training of national health workers in Papua New Guinea (PNG) began in *ca* 1900 with the training of medical assistants (heil tul-tuls) in the New Ireland Province of German New Guinea.¹ Between 1914 and the outbreak of World War II medical assistant training continued under Australian administration and there were ~ 4000 medical tul-tuls in post in the early 1940s. In Papua, rural health was dependent on patrolling European medical assistants until the 1930s when Dr Walter Strong, then Director of Public Health, developed a training programme for national ('native') medical assistants. These assistants were trained in short courses in Sydney and

later in PNG but were not thought to have enough school education to be able to cope with the medical school course in Suva, Fiji, which had been open since 1886.² After World War II, John Gunther (later Sir John) was appointed Director of Public Health, and aid post orderlies (APO) were trained to replace their pre-war counterparts.

MEDICAL TRAINING

In 1947 there were 17 doctors working in PNG, all of whom were expatriate.² In this year six men were sent to the Central Medical School in Suva, Fiji, to train as 'native' medical practitioners. The first Papua New Guinean to graduate from Fiji did so in 1951, and between 1951 and 1963 16 'assistant medical practitioners' were trained there. After some debate in PNG these 'assistant medical practitioners' were called 'dokta' and were later accepted as being as capable as their European counterparts. One of their number, Himson Mulas, trained in anaesthesia in the Alfred Hospital in Melbourne in 1963.³

Assistant medical officer training began in Port Moresby in 1960 at the Papuan Medical College (PMC), and 44 graduates were produced between 1964 and 1970. Two notable West Irian Jayan graduates from the PMC were Adolf Saweri (1965), currently head of the University Clinical Sciences Department, and Hein Danomira (1966), who became the first locally trained surgeon.⁴

The University of Papua New Guinea (UPNG) was founded in 1966 and Sir John Gunther was appointed the first Vice-Chancellor. The first class of medical students obtained their degrees in 1972 and graduated in 1973, with Isi Kevau, now Professor of Medicine, being the first national graduate.³ Table 1 shows the

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number of doctors qualifying from UPNG. By the end of 1999 more than 600 doctors had graduated from UPNG in some 30 years of medical education at the University (Table 1).

THE MB BS COURSE

Course structure

In 1999 the MB BS was an undergraduate course which runs for 5 years. Currently there is a sharp division between pre-clinical and clinical years. Students are exposed to surgery in the 3rd and 4th years of the course (Table 2) and with additional revision before their final exam at the end of the 5th year. This format is similar for the major specialties of surgery, internal medicine, obstetrics and gynaecology, paediatrics, and psychiatry. The two-semester system shown in Table 2 is about to be changed to a three-term system from the year 2000, and problem-based learning is being introduced in 2000. In the new format students will do a 10-week block of surgery.

Examination and assessment

The four major clinical disciplines of surgery, internal medicine, obstetrics and gynaecology, and paediatrics are examined in the final MB BS examination after 5 years. The surgical examinations include two written papers (one of which consists of multiple choice questions (MCQ) and clinical examinations. Since 1996 surgery has run an Objective Student Clinical Assessment (OSCA) with some live patients instead of a long and short case clinical examination.

Evaluation and outcome

External examiners are invited in all clinical subjects and the surgery examiners in the last 10 years have been Joe Shepherd

Table 1. Training of doctors in Papua New Guinea

Years	Nationals	Pacific Islanders	Expatriates	Total
1951–63 Fiji	16	—	—	16
1964–70 PMC	36	7	1	44
1973–77 UPNG	26	7	12	45
1978–87 UPNG	163	47	15	225
1988–98 UPNG	204	33	22	259
Total to 1999	445	94	50	589

In 2000 the class of 1999 with 23 final year students will graduate. Figures to 1987 taken from Biddulph.³

PMC, Papuan Medical College; UPNG, University of Papua New Guinea.

(1991–93), Frank Branicki (1994–95), Irwin Faris (1996–97) and David Theile (1998–99). Their reports confirm that medical students in PNG are educated appropriately and have a similar level of knowledge of clinical surgery compared with their Australasian counterparts, have more practical skills but are weaker in their understanding of basic medical sciences.

The 600th doctor will be trained in PNG by the end of 1999 and will graduate in 2000 (Table 1). Attrition due to retirement, death, private practice and emigration means that approximately half of these doctors still work in the public service and only half of the doctor manpower needs have been met.⁵ The projected medical manpower target for 2005 includes a workforce of 597 doctors (214 of whom should be specialists). The focus must remain on quality rather than quantity because the medical school has little capacity to increase its student output without more staff, funding and resources.

POSTGRADUATE SURGICAL TRAINING IN PAPUA NEW GUINEA

The first trained surgeons arrived in *ca* 1950. R. K. Wilson was the first trained surgeon in Rabaul and Charles Haszler, displaced to Australia from Budapest but whose qualifications were not recognized in Australia, was the first trained surgeon in the Ela Beach Hospital, Port Moresby.⁴ Frank Smyth arrived in Port Moresby in 1958 and stayed for 30 years, where he developed an interest in head and neck surgery. He was joined by Ian Reid who was first appointed as a lecturer in anatomy in the PMC in 1962, and later by Peter Reay-Young.⁴ Ken Clezy, who spent 25–30 years in PNG, became Professor of Clinical Science and was briefly Dean of the Medical Faculty. In 1972 when the Master of Medicine (MMed.) programme was launched all 10 surgeons in Papua New Guinea were expatriates.^{6,7} The first two surgical trainees, Hein Danomira and Karol Popei, obtained their MMed. in 1978. In the 1970s and 1980s medical and surgical registrars from Australia rotated to PNG. Since 1990 it has been only medical registrars who have rotated to PNG from the Royal Prince Alfred Hospital in Sydney.

Master of Medicine course structure and content

Training for the MMed. in General Surgery lasts a minimum of 4 years. It must be carried out in a recognized hospital with the trainee working under a surgical specialist. At the end of the first year the trainees sit for a part I examination in applied surgical sciences. The examination has a common core and specialty core components. The common core is the subject matter that is relevant for all specialty training whether surgery, medicine, pathology etc. The surgical core consists of pathophysiology, surgical pathology and applied anatomy.

Table 2. Basic format of MB BS surgery teaching in the last 30 years

Year	First semester	Hours	Second semester	Hours
Third year	Clinical examination	6	Clinical practice	30
Fourth year	Surgery Subspecialties	50 30	Infectious diseases	6
			Surgery block	8 weeks
Fifth year			Revision block	24

Subspecialties include anaesthesia, ophthalmology and otolaryngology.

The next 2 years are spent rotating through different hospitals in PNG, recognizing the need for all products of the MMed. programme to have exposure to all surgical pathologies. During the 1970s and 1980s national and Australian registrars trained together in PNG. Unfortunately the rotation of Australian surgical registrars stopped in 1990 but some Papua New Guinean registrars have rotated to Alice Springs and Darwin since 1994.

A surgical log book is kept throughout the entire period of training; it is reviewed annually and is presented to the external examiner during the final examination. All registrars are actively involved in surgical audit which was introduced in 1992. Since 1993 each registrar must also write a research paper in thesis format. The thesis is normally some form of clinical audit but some papers have been of sufficient standard to be published in international peer-reviewed journals.⁸⁻¹⁰ As a result of this attention to audit and clinical research since 1993 there have been scientific presentations every year by a national surgeon at meetings in Australia (in addition to the presentations at the PNG Annual Medical Symposium and Association of Surgeons meetings).

The fourth and final year of surgical training is held in Port Moresby. The division of surgery and the Medical Faculty Post-graduate Committee must approve the candidate's readiness to sit the examination. The majority of candidates have required a fifth year before sitting. The extra year is often required for personal reasons rather than academic ability. The MMed. II examination consists of two papers, clinical cases, vivas in surgical pathology, surgical anatomy and surgical management, a ward-round with the examiners on cases the candidate has been managing, and a thesis which is presented both orally and in written form. The examination is conducted by pairs of examiners using a close marking system.

Early management of severe trauma course

The first Early Management of Severe Trauma (EMST) course was held in 1993.¹¹ Since then four more courses have been held and four local instructors trained. All surgeons, anaesthetists and their trainees have now done the course which has become part of MMed. training. There has been some discussion in the Pacific as to whether the EMST course might be too demanding and too difficult. Melanesians have not found this to be the case; the pass rates have been reasonably good although in the early years many struggled with the MCQ format and required an MCQ re-test. In 1999 the initial pass rate rose to 85%; a sign of improvement. We believe that the Advanced Trauma Life Support (ATLS)/EMST should remain the standard for training Pacific Island doctors in the early management of severe trauma.

Surgical skills courses

Courses have been run in basic surgical skills, external fixation and internal fixation, and intestinal anastomosis. The basic surgical skills course covers wound management, skin grafting, airway management, venous access, chest drains, urinary catheters, theatre procedures (diathermy, tourniquet disinfection, sterilization) and plaster of paris application. These courses have to be run in existing teaching facilities and nothing is purpose built.

Costs

The average cost of training a doctor at UPNG between 1987 and 1994 was estimated to be K91 610 (when 1K = 1US\$ in

1994) and a similar sum for a further 4 years of MMed. training.⁵ These costs are normally borne by the government of PNG (Natschool for undergraduates and National Department of Health for postgraduates). Sometimes a student is self-sponsored, or funding comes from some other government (or World Health Organization (WHO) in the case of Pacific Islanders). The costs mentioned here exclude K550 000 per year of Australian aid towards medical training in the medical officers training programme (MOTP) from 1987 to 1994 and, later, a similar amount through the Medical Officers, Nurses, and Allied Health Professionals (MONAHP) project which supported medical and other cadres of health worker training from 1995 to 2000. In 1994 it was estimated that each MMed. graduate cost ~K60 000 in Australian aid. Each specialist has therefore cost about US\$250 000 to train. Although training would have continued without Australian aid, the quality of such training has been greatly enhanced through visiting medical specialists and hospital attachments overseas.

Outcome and evaluation

By 1999, 37 surgeons had obtained the MMed. in General Surgery. The graduates included three Pacific Islanders sponsored by WHO (Douglas Pikacha (1997) and Dudley Ba'erodo (1998) from the Solomon Islands and John Hedson from Micronesia (1995)). The range and quality of surgery performed by the MMed. graduates is, in general, good (see following). Unfortunately almost half of those trained are no longer working in the public sector; a reflection of low salaries, lack of resources and individual attitudes (Table 3).

Papua New Guinea has a population of just under 4.5 million. There are 19 hospitals (Fig. 1), one for each province. The hospitals are graded at levels 1-4. Port Moresby General Hospital is the National Referral Hospital (level 1). It is supposed to provide all services except for radiotherapy which is housed in Angau Memorial Hospital in Lae, one of three level 2 hospitals. (The other two are Mt Hagen and Rabaul.) Surgical training takes place in levels 1 and 2 but also in Goroka Base Hospital (level 3), which shares a site with the well-run, productive but poorly funded National Medical Research Institute. The popularity and success of the surgical training programme means that surgeons are now working in all level 3 (Madang, Wewak, Mendi, Kavieng) and some level 4 hospitals (Alotau, Buka). In 1999 there were six expatriate and 19 national trained surgeons working in the public or university sectors. This is a rate of only one surgeon for every 180 000. This number of surgeons, however, represents a substantial improvement from 20 years ago when the first two national surgeons graduated.

Table 3. General surgeons graduating MMed. from UPNG 1978-2000

Year of qualification	Graduates	Still working in public sector (DOH, defence force or university)
1978-85	5	1
1986-90	9	6
1991-95	13	8
1996-2000*	14*	12*

*Four candidates will sit in November 2000 and at the end of 1999 three former graduates were working as general medical officers in northern Australia.

MMed., Master of Medicine; DOH, Department of Health; UPNG, University of Papua New Guinea.



Fig. 1. Posting of public sector surgeons in Papua New Guinea in 1999. The figures include three University of Papua New Guinea (UPNG) surgeons in Port Moresby but exclude one surgeon working in the Department of Health and one as Chief Medical Officer for the Defence Force. Ear nose and throat and eye surgeons are based only in Port Moresby.

Subspecialties of ophthalmology, ear, nose and throat, and maxillofacial surgery

Four surgeons have obtained an MMed. in ophthalmology, one in maxillofacial surgery and three in ear, nose and throat (ENT). Only one of these eight subspecialists was working in the public sector at the beginning of 2000. In ENT there is an expatriate filling one of five positions. In ophthalmology only two of five positions were filled, both by national surgeons. Only two trainees in any surgical speciality have been female, one in ophthalmology and one in ENT.

Anaesthesia

Anaesthesia is much less well developed as a specialty; the first of seven national MMed. graduates in 1992. Two anaesthetists are female and a third woman is in training. There are two expatriate anaesthetists employed, one in Port Moresby and one in Lae. The anaesthetic service relies upon anaesthetic technical officers (ATO) who are health extension officers with an extra 1 year of training in anaesthesia. Anaesthetic training was boosted by the appointment of Gary Phillips as a visiting professor and Harry Aigeeling, a national lecturer, to the University.

ADVANCED TRAINING AND SPECIALIZATION AFTER MMED

Higher surgical diplomas were introduced in 1994 in recognition of the fact that surgical training should be at least 6 years, and that national surgeons would need to teach subspecialty modules to medical students and MMed. postgraduates in the future.¹² The requirement to still do 4 years of general training to achieve a General Surgery MMed. recognizes the need for surgical exposure to be broad so that, even when someone becomes a subspecialist, they can still be capable of doing an emergency laparotomy or craniotomy. It is important for the future that the specialist groups in Australia who support our training programmes recognize the need for all PNG surgeons to train first as general surgeons, and that only a few of them will eventually limit their practice to their specialty interest in surgery.

Advanced training programmes

Advanced training programmes have been established in orthopaedics, urology, and head and neck. The course involves 2–3 years of advanced training, some of which is conducted in-country with the help of visiting specialists, and some conducted in Australia. The subspecialty diplomas have been taught mainly by the relevant Australian specialist societies (Australian Orthopaedic Association or Urological Society of Australasia). Orthopaedic training has been conducted in PNG until the Higher Diploma examination has been sat and then 6 months is spent in an Australian orthopaedic department. Urology training has been conducted for the first 2 years in Australia and a third year is spent back in PNG with the support of visiting Australasian urologists. Head and neck training has consisted of 1 year in PNG and 1 year in Australia. Advanced training in paediatric and cardiothoracic surgery have commenced and neurosurgery is due to start in 2001.

At the end an examination is held with written, clinical and viva components. One or two external examiners from the relevant specialty also participate. The higher specialist diplomas are awarded by UPNG, but the Australian Orthopaedic Association awards a joint diploma and the Urological Society of Australasia provides a certificate of training.

Financial support

Financial support for the development of these new programmes has been through medical aid projects in PNG. The main donor has been AusAid, through their Medical Officer Training Programme (MOTP) which ran from 1987 to 1995 before it was expanded to include nursing officers and allied health workers (MONAHP). The Royal College of Surgeons of Edinburgh also sent two visiting specialists. In 1996 the Pacific Islands Project (PIP), which is managed by the Royal Australasian College of Surgeons (RACS), commenced,¹³ and a second phase is now called the Tertiary Health Services (THS) Project to distinguish it from specialist services to other Pacific islands. The RACS-managed projects support tertiary, mainly surgical, services and allow the transfer of skills to national counterparts who work with the teams. In orthopaedics they have also acted as the main provider of teachers for orthopaedic training in-country. Rotation to Australian hospitals is supported by AusAid through MONAHP. Visiting specialists contributing to training in PNG are also supported by AusAid both through MONAHP and the RACS-managed PIP/THS project.

Outcome and evaluation

In 1990 there were no national surgeons trained to an advanced specialist level. Now in 2000 there are three orthopaedic surgeons, two urologists and one head and neck surgeon. A fourth orthopaedic, second head and neck, and the first paediatric surgeon are currently being trained. Undergraduates are now taught by those who are up-to-date and trained specialists in their subject rather than by a general surgeon whose knowledge outside his field of general surgery may be at least 15 years out of date. This is, for PNG, a remarkable step towards self-sufficiency and sustainability. These national surgeons with higher surgical diplomas provide a specialist clinical service and have built their own network of support with Australasian surgeons within the appropriate division of the RACS.

It has disappointed us that, despite these projects being so effective, some donors seem to lack the ability to evaluate and recognize the success of their own contributions.

CONTINUING MEDICAL EDUCATION

Continuing Medical Education (CME) is important in maintaining and developing specialist skills. The Medical Society of Papua New Guinea was founded in 1964 and Charles Haszler, a surgeon, was its first president. The Association of Surgeons of PNG was founded some 4 years later. Both these bodies have contributed significantly to keeping doctors and specialists in PNG up to date. Australasian and other overseas specialists can play a major role in supporting the process of CME. Visiting medical specialists have given many lectures and demonstrated skills around the country. Most surgical visitors have been subspecialists in neurosurgery, orthopaedics, paediatric, plastic surgery or urology rather than generalists. In 1998 CME activities were boosted by the President of the RACS, Bruce Barraclough, who visited and conducted a 2-day workshop in breast disease. Russel Stitz, Chairman of the Colorectal Section, also taught and operated for 3 days in colorectal surgery. Herman Oberli, a Swiss orthopaedic surgeon from Honiara, did an external fixation workshop and Michael Muller taught on burns at the Association of Surgeons meeting. The EMST course was first held as a CME activity for existing specialists in 1993.¹¹ In 1999 every surgeon and surgical trainee in the country has done the EMST course and it has become a requirement for surgical training.

SURGICAL RESEARCH

Over the years presentations of surgical research have been made at the annual meetings of the Association of Surgeons of PNG and the medical society, which is now in its 35th year. The standard of presentation at these meetings has risen in the 1990s, most probably as a result of clinical audit, more academic focus and because all surgical trainees in the 1990s must both do a research project and become computer literate. In 1999 the majority of papers were presented using a multimedia projector and a laptop computer. National surgeons have also presented a number of papers overseas. For example, seven registrars have presented papers at the Provincial Surgeons Association and eight at the RACS Annual Scientific Congress.

Publications from the University Division of Surgery since 1992 include two books,^{14,15} more than 50 papers or book chapters in refereed journals and more than 70 abstracts/presentations at international or regional meetings. The highlights of progress in research capabilities by national surgeons have been papers in the *British Medical Journal* and *The Lancet* on hormone receptors in breast cancer and malaria in patients with splenectomy.^{8,10} Both papers originated from work done for the MMed. thesis. Joint research into the molecular biology of breast and oral cancer is being conducted in Townsville. Trauma has also been a popular topic for study because it is such a common surgical problem in PNG.^{9,16-19}

CONCLUSIONS

Medical and surgical training have made great strides in the last 30 years. By the year 2000 PNG will have produced more than 600 doctors. This represents only approximately half the number of doctors required, and at the present rate of production

we will not meet health department workforce targets.⁵ Surgical manpower is similarly numerically deficient. Nevertheless there have been great advances in the quality of surgical training. In the early 1970s surgery was in the hands of expatriate surgeons who laid the foundations for specialist training. A 4-year MMed. programme in surgery was introduced in 1972 and has produced 34 national and three Pacific island surgeons. Surgeons are not just concentrated in the big centres but are now working in level 3 and some level 4 hospitals. This offers the disadvantaged rural population better access to surgical services. National surgeons now not only provide the backbone of the surgical service but also do much of the undergraduate and some of the postgraduate teaching. The last decade saw the development of subspecialty training for national surgeons in orthopaedics, urology and head and neck surgery with the result that PNG is more self-reliant for undergraduate and MMed. training in the future. It costs approximately US\$250 000 to train each specialist to MMed. level. A substantial contribution to training (approximately one-third) was made by donors, particularly AusAid. The quality and appropriateness of the training has been forged by the combined effort of local surgeons, visiting specialists and coordination by the University Division of Surgery. This will be the basis for expansion and development in the next century.

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