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General surgery in crisis – the critical shortage

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Summary

Introduction. General surgery is facing a serious crisis. There has been a significant decline in the number of applicants for registrar posts and an inability to attract and retain general surgical specialists in the state sector. The Association of Surgeons of South Africa (ASSA) undertook this study to determine the extent and cause of the problem.

Methods. The study involved a combination of desk research and structured interviews. In addition, the Health Professions Council of South Africa (HPCSA) database was reviewed and compared with the South African Medical Association (SAMA) and ASSA databases. The medical schools provided information about student numbers and demographics, and the National Department of Health pro vided information about the status of medical practitioner and specialist posts in the state sector.

Results. Overall, 26.1% of the specialist posts were vacant. The situation was particularly critical in Mpumalanga and the Eastern Cape, where 84% and 58% of the specialist posts were vacant. Using a predictive model, a conservative estimate of the need for general surgeons was found to be at least 50 per year. Currently the eight medical schools graduate about 25 general surgeons per year. The changing demographics of medical students may be partly responsible for the decline in registrar applicants.

Conclusion. The findings from this study have revealed that the shortage of general surgeons in the state sector has reached critical levels.

General surgery is facing a serious crisis. In the past general surgery was an extremely popular career choice for newly qualified medical graduates. There was a healthy competitive demand for registrar posts at all local medical schools and these posts were always oversubscribed. However, there has been a dramatic decline in the number of applicants for registrar posts at all of the academic centres.[1-3] Some of the departments have had as many as 25% of the posts unfilled. A further concern has been the inability to attract and retain general surgical specialists in the state sector. Although it would appear that we have been training adequate numbers of general surgeons over the years, very few of them continue to practise in the state sector. Consequently many of the specialist posts in the non-academic centres, especially in the periphery, remain unfilled.

The Association of Surgeons in South Africa (ASSA) has been concerned about both the diminishing number of applicants presenting for general surgery training and the increasing number of general surgery posts that are vacant in the state sector in South Africa. As a result, ASSA took a decision in May 2004 to initiate a study to determine the extent and the cause of the problem.

The primary objective in commissioning this study was to collect and analyse comparative data that would enable ASSA to evaluate the factors which impact on a career in general surgery, in particular, the working conditions and the relative equity of the remuneration of general surgeons in South Africa. The relative equity not only referred to a comparison with other fields of medical specialisation, but also extended to other professions in general. ASSA would also like to use the study findings as a basis for developing strategies to correct the current inequities between surgeons and other medical specialists as well as other professionals, and to enhance the attractiveness of general surgery as a profession.

There were four aspects to the study, including an assessment of the shortage of general surgeons, an assessment of the factors that impact on the choice of general surgery as a career option, a report on the level of remuneration of specialists in the state sector, and a report on the level of remuneration of specialists in the private sector. In this paper we report on the critical shortage of medical practitioners and specialists in the state sector.

Methods

P-E Corporate Services (P-ECS) were contracted to undertake this study on behalf of ASSA. The terms of reference were to report on the work environment, conditions

of service and remuneration for general surgeons, both in the state and the private sector.

The approach to this assignment was based on a combination of desk research and structured interviews. The desk research included an in-depth study of relevant data in professional medical publications, other studies and the Internet. P-ECS also utilised their own extensive database of remuneration levels and employment policies across most sectors of the South African economy.

The structured interviews were undertaken with general surgeons in the state sector and in private practice, heads of departments, registrars, and other medical specialists. The surgeons interviewed were from Gauteng, the Free State, the Western Cape and KwaZulu-Natal. A structured questionnaire was developed to research the perceptions of recently qualified specialists and registrars about their choice of general surgery as a career option, and about the current state of the profession in general.

The Health Professions Council of South Africa (HPCSA) database was reviewed to determine the number of medical practitioners, both general practitioners and medical specialists, in practice. These data were compared with the South African Medical Association (SAMA) and the Association of Surgeons of South Africa (ASSA) databases.
The medical schools also provided data with regard to the number of applications, the number of students registered, and the number of students graduating.

The National Department of Health provided data with regard to the total number of medical practitioner and specialist posts available in the various provinces, and whether the posts were filled or vacant.

Results

Populations of medical practitioners

The most recent statistics available from the HPCSA indicated that 19 195 general practitioners were registered with the Council and this, plus some 2 000 community service doctors, yielded a national total supply statistic of approximately 21 200 general practitioners (Table I). At the same time there were 9 025 specialists registered with the HPCSA, of whom 954 (10.5%) were categorised as surgeons.

ASSA is the official representative body for all general surgeons in South Africa and includes subspecialists such as vascular, trauma and gastrointestinal surgeons. The current ASSA membership totalled approximately 550. The general surgeons who were not ASSA members were assumed to be no longer practising in South Africa, retired, or not members of the Association out of choice, since membership was voluntary.

SAMA claimed that approximately 70% of all specialists belonged to the Association. In fact the SAMA database included 6 954 specialists. The number of surgeons included in this SAMA database was 540, approximately 8% of the population of specialists.

Public and private sector breakdown

The breakdown of the medical professionals into those employed in the public and private sectors, according to the HPCSA and the SAMA statistics, are shown in Table I. There was excellent correlation between the statistics obtained from the HPCSA and the SAMA databases. Both databases indicate that approximately one-third of the specialists were employed in the public sector compared with two-thirds employed in the private sector.

The SAMA statistics also revealed that 27% of the population of specialists on the database had graduated/qualified during the past 10 years (1994 - 2004). Similarly, 23% of the population of surgeons on their database had graduated/qualified during the past 10 years.

A review of the ASSA membership database showed that of the 161 members for whom identity numbers were available, 22% were over 60 years of age, 40% over 55 years and 63% over 50 years.

The ASSA database also indicated that 43% of the general surgeons worked exclusively in the private sector. Of the 30% of general surgeons who worked for the state, 67% (or 20% of the total sample) participated in remunerated work outside of the public sector (RWOPS). The remaining 27% of general surgeons in the ASSA database worked in both the state and private sectors.

Vacant posts in the state sector

The Department of Health statistics as of August 2004 indicating the shortages of medical practitioners and medical specialists in each of the provinces are shown in Table II. The number of posts, number of posts filled and number of vacant posts are shown for each category of staff. The national data for medical practitioners and specialists indicated that of the 10 881 general practitioner posts available in the state sector, 26.6% were vacant and of the 4 464 specialist posts available, 26.1% were vacant. The situation was particularly critical in Mpumalanga, the Northern Cape and the Eastern Cape, where shortages exceeded 40%. More specifically, 84% of the specialist posts in Mpumalanga, 58% in the Eastern

TABLE I. HPCSA AND SAMA STATISTICS OF GENERAL PRACTITIONERS AND SPECIALISTS IN THE STATE AND PRIVATE SECTORS

	HPCSA statistics			SAMA database		
	Public sector	Private sector	Total	Public sector	Private sector	Total
General practitioners	**7 987 (42%)**	**11 208 (58%)**	**19 195 (100%)**			
Specialists	**3 298 (37%)**	**5 727 (63%)**	**9 025 (100%)**	**2 154 (32%)**	**4 573 (68%)**	**6 954 (100%)**
Surgeons (included under specialists)	**n/a**	**n/a**	**954**	**188 (36%)**	**335 (64%)**	**540 (100%)**

Cape and over 40% in Limpopo and North-West province were vacant. In contrast, in the Western Cape only 4.7% of the specialist posts in the state sector were unfilled.

Predictive model of the need

It is difficult to determine the actual demand for general surgeons in both the state and private sectors. A predictive model could be used to estimate the number of general surgeons that need to graduate annually to meet the demand for surgical services in South Africa. Thus, for example, the following assumptions and calculations could be made. It can be assumed that South Africa's population of 40 million people will require 720 000 general surgery admissions per year and that a general surgeon may typically handle 5 - 10 admissions and/or consultations of varying complexity per day. General surgeons, after allowing for leave, conferences and development time, etc. may be expected to have 200 - 220 working days available. A general surgeon would therefore have the capacity to handle some 1 500 admissions/ consultations per year.

A 5 - 10% attrition rate should be applied to allow for normal retirements, deaths and those who leave the profession for other reasons. The theoretical need, calculated on the basis of the above assumptions, would therefore be approximately 500 general surgeons to meet current demands. However, considering the nature of the assumptions, this need could range from 350 to 700, i.e. between 1 surgeon per 115 000 population and 1 surgeon per 57 000 population.

Based on the above attrition rate, the calculations suggest that the number of surgeons that need to be graduated annually to meet the demand would be in the 40 - 50 range. It should, however, be borne in mind that the above theoretical calculation assumes that the full population of general surgeons is engaged in providing full-time service. This is obviously a simplification, particularly in the state sector, where surgeons have additional academic and administrative responsibilities. Furthermore these figures do not take into account the high net rates of emigration of medical graduates from South Africa.

TABLE II. THE DEPARTMENT OF HEALTH STATISTICS INDICATING THE NUMBER OF FILLED AND UNFILLED MEDICAL PRACTITIONER AND SPECIALIST POSTS IN EACH PROVINCE

Province	Occupational classification	Total filled	Total vacant	Total posts	% vacant
Eastern Cape	**Medical practitioners**	**823**	**489**	**1 312**	**37.3**
	Medical specialists	**153**	**208**	**361**	**57.6**
		976	**697**	**1 673**	**41.7**
Free State	**Medical practitioners**	**570**	**212**	**782**	**27.1**
	Medical specialists	**244**	**101**	**345**	**29.3**
		814	**313**	**1 127**	**27.8**
Gauteng	**Medical practitioners**	**1 557**	**570**	**2 127**	**26.8**
	Medical specialists	**1 168**	**370**	**1 538**	**24.1**
		2 725	**940**	**3 665**	**25.6**
KwaZulu-Natal	**Medical practitioners**	**1 943**	**494**	**2 437**	**20.3**
	Medical specialists	**546**	**263**	**809**	**32.5**
		2 489	**757**	**3 246**	**23.3**
Limpopo	**Medical practitioners**	**718**	**185**	**903**	**20.5**
	Medical specialists	**66**	**49**	**115**	**42.6**
		784	**234**	**1 018**	**23.0**
Mpumalanga	**Medical practitioners**	**555**	**398**	**953**	**41.6**
	Medical specialists	**13**	**67**	**80**	**83.8**
		568	**465**	**1 033**	**45.0**
North West	**Medical practitioners**	**429**	**173**	**602**	**28.7**
	Medical specialists	**54**	**42**	**96**	**43.8**
		483	**215**	**698**	**30.8**
Northern Cape	**Medical practitioners**	**231**	**250**	**481**	**52.0**
	Medical specialists	**20**	**10**	**30**	**33.3**
		251	**260**	**511**	**50.9**
Western Cape	**Medical practitioners**	**1 154**	**113**	**1 267**	**8.9**
	Medical specialists	**1 027**	**51**	**1 078**	**4.7**
		2 181	**164**	**2 345**	**7.0**
National Depts	**Medical practitioners**	**7**	**10**	**17**	**58.8**
	Medical specialists	**7**	**5**	**12**	**41.7**
		14	**15**	**29**	**51.7**
Total	**Medical practitioners**	**7 987**	**2 894**	**10 881**	**26.6**
South Africa	**Medical specialists**	**3 298**	**1 168**	**4 464**	**26.1**
		11 285	**4 060**	**15 345**	**26.5**

Currently the eight medical schools graduate approximately 25 general surgeons per year. This therefore represents only half of the most conservative estimate of numbers required to maintain the country's current service levels.

Trends in university/medical school applications

Collectively, South African university medical schools have received an average of 10 251 applications for admission to medicine, per annum, for the past 4 years (Table III). About 9% of these applications were successful and admitted to the first year. It should be noted, however, that this understated the actual percentages of successful applications as many students applied to more than one medical school. It was evident that there was a steady supply of school leavers eager to enter the medical profession each year.

Of the numbers of medical students graduating annually, medical school statistics indicate that approximately 40 doctors (3.5% of graduates) were applying to specialise in general surgery each year. This admission rate to surgery was approximately 30% lower than the numbers required to maintain the service levels.

The impact of transformation of the South African economy and socio-political structures

It is common cause that the South African economy and socio-political structures are in transformation. The background and reasons for this are well established. Of relevance, however, is the Employment Equity Act, which has as its stated objective: 'to eliminate unfair discrimination in employment practices and, at the same time create a diverse workforce which reflects the national and regional demographics of South Africa's economically active population'. In the medical field the changes have impacted on diverse issues ranging from the racial and gender composition of university student admissions to how and where medical services are delivered.

University admissions

The racial and gender mix of students registered for first-year studies at the South African medical schools over the last 4 years are shown in Table IV. Sixty per cent of all student registrations were now females, with only 40% being males. The proportion of female students has increased from 10% in the 1960s to 17% in the 1970s, 22% in the 1980s, 46% in the 1990s, and the current 60%.

The proportion of black students increased from 35% in 2001 to 43% in 2004. Registration of white students has declined from 39% to 33% over the same period. The total proportion of students with historical 'pdi' status, i.e. black and female, has increased from 61% to 67%.

While the rationale on which these directives were based was fully understandable, there have also been certain unavoidable consequences. Many of the country's most talented and ambitious school leavers, who might otherwise have considered a career in medicine, have elected to pursue other professions.

Furthermore, the gender mix trend in student intake has had an adverse impact on the availability of general surgery candidates in particular. The proportion of female doctors who elect to specialise in surgery has traditionally been lower than for male doctors. In addition, the perception among interviewees was that those females who did want to specialise tended to select specialties where practice hours were usually limited to normal working hours. Reluctance on the part of females to enter into general surgery was attributed both to 'family' reasons and to concerns about security associated with after-hours work.

At the University of KwaZulu-Natal Medical School only 16% of the current registrars were female, compared with a female student intake of over 50%. The University of the Free State only had 2 female registrars. A previous study from the University of the Witwatersrand noted that 9.9% of male graduates sampled have specialised in surgery and surgical specialties, compared with only 0.9% of female graduates.

TABLE III. UNIVERSITY APPLICATIONS AND ADMISSIONS TO MEDICINE IN SOUTH AFRICA

Year	No. of applicants	No. of admissions	% admitted
2001	**10 184**	**921**	**9.0**
2002	**10 141**	**917**	**9.0**
2003	**10 203**	**892**	**8.7**
2004	**10 474**	**913**	**8.7**
Average	**10 251**	**911**	**8.9**

TABLE IV. RACIAL AND GENDER MIX OF STUDENTS REGISTERED FOR FIRST YEAR AT THE SOUTH AFRICAN MEDICAL SCHOOLS

		Gender mix				Racial mix							
		Male		Female		Black		White		Indian		Coloured	
Year	Total registrations	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
2001	**921**	**366**	**40**	**555**	**60**	**319**	**35**	**360**	**39**	**170**	**18**	**72**	**8**
2002	**917**	**349**	**38**	**568**	**62**	**342**	**37**	**363**	**40**	**165**	**18**	**47**	**5**
2003	**892**	**365**	**41**	**527**	**59**	**359**	**40**	**331**	**37**	**142**	**16**	**60**	**7**
2004	**913**	**363**	**40**	**550**	**60**	**394**	**43**	**303**	**33**	**154**	**17**	**62**	**7**

Practice qualification requirements

Transformation within the medical profession has included changes in the way in which doctors qualify to practise, and are authorised to practise. Medical students are required to complete a year of community service, which is seen as being of potential benefit. However the lack of consultation about the location of postings, restraints on personal freedom of choice, and poor and inadequate facilities, expertise, supervision and administration at many hospitals, have all provided strong disincentives.

The pending legislation that will require doctors in the future to obtain a Certificate of Need dictating where they may practise was seen as impacting on personal freedom of choice and a further disincentive to specialise.

Immigration and emigration

According to official statistics (Statistics SA), emigration from South Africa has ranged between 8 000 and 16 000 people per annum, and has averaged 10 400 per annum over the past 10 years. Immigration, on the other hand, has ranged between 3 000 and 10 600 over the same period, averaging 6 400 per annum. The country has therefore suffered a net loss of some 4 000 people per annum over this period.

Medical practitioners have comprised 0.8 - 1.2% of total emigrants over the past 5 years. It is not known what proportion of this sample comprised specialists. However, data from Statistics SA for 1997/98 indicated that specialists accounted for 20 - 30% of medical practitioner emigrants at that time.

As a rough approximation medical practitioners may be estimated to account for some 1% of an average of 4 000 people per annum, i.e. 40 practitioners per annum. Specialists could account for 8 - 10 of these professionals. However, it is well acknowledged that many professionals leaving South Africa permanently do not necessarily follow official emigration procedures. Thus the 'real' brain drain statistic would have been approximately three times the official statistic. A crude deduction would suggest that South Africa was currently losing at least 100 - 200 medical practitioners, including 25 - 50 specialists, annually as a result of emigration.

South Africa apparently loses almost half of its qualified doctors to the UK, Canada and Australia. According to Departmental estimates from 2001, over 23 000 South African medical health professionals (all categories) were working overseas in English-speaking 'First-World' countries. The majority are in the UK (38%), the USA (30%), Australia (15%) and Canada (10%).

The impact of the exodus of medical professionals from developing countries has been enormous. Approximately 6% of all British and 10% of all Canadian hospital-based doctors are South African. Only 60 of 500 doctors trained in Zambia since independence still work in that country, and Mozambique has only 500 doctors to service a population of 18 million. Malawi has only one general surgeon and one orthopaedic surgeon in the government health service.

Discussion

The Association of Surgeons, because of concern about both the decreasing number of applicants for general surgical registrar posts and the increasing number of unfilled specialist posts in the state sector, commissioned P-ECS to undertake this study into the status of general surgery. This part of the study documents the shortage of general surgeons and some contributing factors.

The findings from this study have revealed that the shortage of qualified general surgeons (and other medical practitioners) in the state sector has reached critical levels, to the extent that this is receiving regular media attention. Where over 50% of specialist posts remain continuously vacant in certain provinces, it is difficult to understand what additional evidence is required for the situation to be acknowledged as a crisis. The situation is particularly critical in Mpumalanga, the Northern Cape and the Eastern Cape.

The extent to which the number of general surgeons practising in the private sector is in line with the demand for medical treatment is difficult to gauge with accuracy. Various sources, such as the SAMA and the medical aid associations, have suggested that in their opinion South Africa had an adequate supply and possibly an oversupply of medical professionals within the private sector. However, it should be remembered that the high-volume demand for medical treatment in South Africa is met through state sector institutions.

HPCSA statistics indicated that some 1 300 general practitioners were registering to practise each year. These numbers may be reconciled with annual demand for general practitioners by applying a 5 - 10% attrition rate to the current population of ±20 000 general practitioners, i.e. an annual requirement of between 1 000 and 2 000 general practitioners.

The fact that there is believed to be an oversupply within the private sector is counter-balanced by severe shortages in the state sector. In overall terms it is therefore very possible that the requirement for medical practitioners exceeds the current supply. The above sources also suggested that South Africa had an adequate supply of specialists in most medical specialties within the private sector. The population of specialists as noted above exceeds 50% of the number of general practitioners, indicating that there is one specialist for every two general practitioners. The population of surgeons may be estimated from the same statistics as 5% of the population of general practitioners, or one surgeon for every 20 GPs.

It has been estimated that South Africa needs to produce in excess of 50 general surgeons per year, based on the usual attrition rate. Currently the eight medical schools graduate less than 25 general surgeons per year on average. In other words, the numbers of general surgeons qualifying annually is substantially lower, and possibly no more than 50% of current estimates. Furthermore, a significant proportion of these recently qualified specialists emigrate, either temporarily or permanently, to practise abroad.

Further evidence of the critical shortage of surgeons is the fact that 63% of the general surgeons belonging to ASSA were over the age of 50 years. Not only are the numbers of general surgeons being trained inadequate, but many young surgeons elect to emigrate.

Various factors have been identified as being responsible for the decline in the number of applicants for general surgical training posts. Changes in the demographics of medical students, with an increase in the numbers of female and black students, appear to be partly responsible. Female and black students tend not to consider a career in surgery as an option, probably because of the lack of suitable role models.

Many black students also have financial responsibilities that preclude them from specialising after completing the internship and community service years.

Other factors contributing to the large number of unfilled specialist posts in the state sector, such as poor remuneration and poor working conditions, will be discussed in the subsequent reports.

In summary, therefore, the critical shortage of specialists in the state sector, which has reached crisis proportions, has been aggravated by the fact that the number of surgical graduates per year has been grossly inadequate. Transformation at medical schools may be partly responsible for the decline in the number of applicants for surgical registrar posts.

Mr Brian Ruff, of Discovery Health, provided the predictive model to estimate the need for general surgeons.

REFERENCES

1. Marschall JG, Karimuddin AA. Decline in popularity of general surgery as a career choice in North America. *World J Surg* 2003; **27:** 249-252.
2. Podnos YD, Campbell B, Wilson SE, *et al.* Patterns of graduating medical student career selections from 1997 to 1998 and their effect on surgery as a career choice. *Arch Surg* 1999; **134:** 876-880.
3. Cofer JB, Biderman MD, Lewis PL, *et al.* Is the quality of surgical residency applicants deteriorating? *Am J Surg* 2001; **181:** 44-49.