Research from the South

Training doctors and surgeons to meet the surgical needs of Africa

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Abstract

An audit of the operations performed and the use of anaesthesia over one year at the University Teaching Hospital, two provincial hospitals, and five district or church hospitals in Zambia was carried out. The aim of the audit was to determine what proportion of operations required full surgical training and to collect information on which recommendations for training surgeons in central Africa could be based.

Of the 21 245 operations performed, 18 401 (86·4%) were found not to be complex, and the procedures could be taught to non-surgeons. General anaesthesia was used often, but if more doctors were trained to give local and regional anaesthesia more necessary surgery could be performed.

Introduction

Existing health services cannot meet the needs of people for operations in developing countries. Nordberg estimated that only 10-15% of patients who required repair of inguinal hernias or caesarean sections were operated on in east Africa.[1] Most people in developing countries live in rural areas, but the facilities for performing operations and the surgeons are concentrated in the cities. The results of a study in Colombia, South America, however, suggested that there was underuse of both operating theatres and well trained surgeons in these centres, as well as poor organisation.[2] Three quarters of operations performed in a large district hospital in Colombia could have been done by doctors who did not have a full surgical training.[2]

Who should be trained and how can the trainee best be prepared to perform the range of operations required in rural Africa? To answer these two questions we carried out a survey of operations in four church hospitals, one district hospital, two provincial hospitals, and the University Teaching Hospital in Zambia.

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Methods and results

We examined the operation registers of the hospitals which had been kept by the nurses. Each operation for 1984 was recorded except for Chitokoloki and Chikankata hospitals, where figures for 1985 were recorded. The numbers at the University Teaching Hospital were so large—15 937 a year—that the number for six months was recorded and then doubled. The type of anaesthesia used for each operation was also recorded.

The operations were grouped according to the following subspecialties: general surgery, urology, orthopaedics, obstetrics and gynaecology, ophthalmology, and otolaryngology and within each subspecialty according to complexity and the extent of surgical training required. The four categories were:

Group A—Operations that should be within the competence of any qualified doctor or suitably trained paramedic—for example, incision and drainage of abscess, wound repair, insertion of an intercostal drain, removal of a foreign body from the cornea, and catheterisation.

Group B—Operations that could be performed by a doctor or paramedic specially trained for the procedure—for example, hernia repair, dilatation and curettage, caesarean section, manipulation of closed fractures, and cataract extraction.

Group C—Operations that normally should be performed by someone with a higher qualification and surgical training appropriate for developing countries—for example, hysterectomy, open prostatectomy, cholecystectomy, and internal fixation of fractures.

Group D—Operations that require subspecialty training beyond the scope of the average general surgeon—for example, total hip replacement, surgery for glaucoma, repair of vaginal fistulas, sphincter saving coloanal and ileoanal surgery, and transurethral prostatectomy.

Table I gives the number of doctors with surgical and anaesthetic skills at each hospital during the period of the study, as this affects the type and number of operations performed. There were no neurosurgeons or cardiothoracic surgeons in Zambia at this time. One district hospital, Luwingu, had no doctor during the study and therefore only 95 operations were performed (table I), mainly incision and drainage of abscesses and manipulation of simple fractures.

Operations in general surgery and obstetrics and gynaecology accounted

TABLE I—*Details of eight hospitals in central Africa for one year*

	University Teaching Hospital	Monze	Mongu	Luampa	Solwezi	Chikankata	Chitokoloki	Luwingu
No of admissions	92 721	12 495	17 808	2 118	8 128	5 748	2 149	2 283
Average No of patients a day	1 191	918	250	97	152	222	204	29
No of beds or cots	1 633	266	374	141	208	280	254	55
No of deliveries	23 900	1 963	1 445	336	637	586	223	156
No of caesarean sections	767	117	48	9	8	57	20	0
No of major operations	3 953	136	226	228	187	175	242	0
No of minor operations	13 691	489	1 832	259	361	496	517	95
No of doctors	195	5	8	2	11	3	2	0
No of surgeons (FRCS)	20	0	2	0	2	0	0	0
No of anaesthetists	4	0	0	0	1	0	0	0
No of clinical officer anaesthetists	20	2	2	0	2	1	0	0

Note: Some figures were obtained from Ministry of Health annual returns. The numbers of operations are not necessarily the same as those obtained from operation registers.

for over three quarters of those done in all the hospitals. Operations in urology, ophthalmology, and otolaryngology were performed depending on the presence of surgeons with training in those subspecialties. Most of the operations (18 401, 86·4%) were not complex and fell into groups A and B (table II). Table III lists the 10 most commonly performed major and minor operations. Most operations were carried out under general anaesthesia in the University Teaching Hospital and in other hospitals that had clinical officers who had trained in anaesthesia at the teaching hospital (table IV), whereas in three church hospitals (Luampa, Chitokoloki, and Chikankata) local or regional anaesthesia was given to over half of the patients. Table V gives the number of operations performed at each hospital in general surgery and they are grouped according to complexity—that is, A, B, C, D.

Discussion

This audit of operations carried out in district, church, and central hospitals in central Africa provides no information on urgent operations that were needed but not done or which elective operations might have been carried out if surgeons with adequate skills and adequate facilities had been available. Nordberg estimated that less than 15% of necessary operations are performed in east Africa.[1]

Nurses had recorded the operations in all the hospitals visited. Thus operations were not listed as accurately as if a surgeon had kept the records. For example, "laparotomy" covers many different procedures. This probably does not alter the overall picture, however. Operations performed under local anaesthesia in outpatient clinics—for example, pterygium and cystoscopy at the teaching hospital—were not included in the register.

In most teaching hospitals operations such as circumcision, hydrocelectomy, or orchidopexy would be performed by a urologist or by a general surgeon, and for this audit they were included under general surgery. Goodacre reported that 16-19% of the surgery performed in Mvumi Hospital in rural Tanzania was plastic or reconstructive surgery.[3] He included skin grafts for burns, drainage of hand infections, leg ulcers, and urogenital fistulas under plastic surgery. Most of these operations are also within the competence of the general surgeon who has no formal training in plastic surgery. We included more specialised operations such as cleft lip and palate repair under group D general surgery—that is, requiring subspecialty training. All operations in groups A, B, and C should be within the capability of a general surgeon with an FRCS, an MMed(Surg), or an equivalent degree, who can treat at least 90% of surgical disorders. Surgeons who are being trained in urology and orthopaedics should first train in general surgery to be able to perform most surgery in groups A, B, and C. Most surgeons in Europe and in Africa are not trained broadly enough to meet the demands in rural Africa.[4]

We make the following recommendations:

(1) Doctors in district hospitals should be taught how to perform operations in groups A and B. Clinical officers can also be trained in countries where this is acceptable. Not all doctors would be expected to carry out all of these operations, but they would be able to perform commonly needed and lifesaving procedures.

(2) Doctors should be trained in hospitals where reasonable numbers of commonly needed operations can be performed in a short time. The central teaching hospital may not be the right place, for such training conflicts with the needs of the MMed programmes.

(3) A trained doctor should be supported in his hospital by regular visits from a specialist surgeon who can gradually expand his repertoire and perform the more difficult procedures. The visit of the specialist helps to maintain morale and quality control and gives confidence to the doctors in district hospitals.[5] Such visits are most economical if made by small plane.[6] Mobile operating theatres may be driven to rural areas, where clinical assessment, surgery, and postoperative care may be carried out.[7,8]

(4) General surgeons should be trained to perform most, if not all, group A, B, and C operations and thus have to be more "generally" trained than surgeons in the West. They should receive part of their training in district hospitals. Postfellowship or higher surgical training should be taken in one of the subspecialties.

TABLE III—*Ten most frequently performed major and minor operations. (All hospitals combined)*

Major operations	No	Minor operations	No
Caesarean section	917	Dilatation and curettage (including 342 terminations)	5401
Laparotomy (including ruptured ectopic and turbo-ovarian surgery)	696	Abscess	3418
Hernia and scrotum	475	Closed reduction	1642
Sequestrectomy	380	Biopsy excision	1551
Operative reduction or internal fixation	366	Wound repair	1113
Cataract	340	Foreign body removal	667
Amputation	189	Skin graft/sloughectomy	591
Hysterectomy	183	Cystoscopy	572
Trabeculectomy	153	Circumcision	517
Appendix	116	Perianal	318

TABLE IV—*Number of operations in which anaesthesia was used*

	Total No of operations	Anaesthesia		
		None	General	Local or spinal
University Teaching Hospital	15 937	357	14 483	1 097
Monze	1 793	27	1 701	65
Mongu	1 431	153	712	566
Luampa	403		1	402
Solwezi	432	3	384	45
Chikankata	793	100	336	357
Chitokoloki	408		71	337
Luwingu	95		6	89

Note: Figures were obtained from the operation register book in each hospital.

TABLE II—*Numbers (and percentage underneath) of operations in each subspecialty from groups A and B (figures in parentheses are total numbers of operations performed)*

	General surgery	Urology	Orthopaedics	Obstetrics and gynaecology	Ophthalmology and ear, nose, and throat	Total
University Teaching Hospital	6447 (7052)	210 (364)	1772 (2334)	4730 (5574)	320 (613)	13 479
	(91·4)	(57·6)	(75·9)	(84·8)	(52·2)	(84·5)
Monze	701 (705)	4 (7)	183 (190)	750 (891)	—	1 638
	(99·4)	(57·1)	(96·3)	(84·2)	—	(91·3)
Mongu	769 (820)	43 (51)	203 (241)	289 (307)	12 (12)	1 316
	(93·7)	(84·3)	(84·2)	(94·4)	(100)	(91·9)
Luampa	239 (255)	1 (1)	13 (15)	33 (46)	86 (86)	372
	(93·7)	(100)	(86·7)	(71·7)	(100)	(92·3)
Solwezi	225 (256)	13 (20)	58 (66)	85 (90)	—	381
	(87·9)	(65)	(87·8)	(94·4)	—	(88·2)
Chikankata	426 (446)	3 (3)	36 (48)	226 (228)	71 (71)	762
	(95·5)	(100)	(75)	(99)	(100)	(96)
Chitikoloki	217 (244)	4 (15)	10 (12)	97 (107)	30 (30)	358
	(88·9)	(26·6)	(83·3)	(90·6)	(100)	(87·7)
Luwingu	64 (64)	—	31 (31)	—	—	95
	(100)	—	(100)	—	—	(100)
Total	9088 (9842)	278 (461)	2306 (2937)	6210 (7243)	519 (812)	18 401
	(92·3)	(60·3)	(78·5)	(85·7)	(63·9)	(86·4)

The teaching hospitals in most developing countries are better equipped than other hospitals and have the highest concentration of specialists and subspecialists. They are also more expensive both for the state and for the family, who usually pay for transport to and from the city, and it costs even more to transport a body home if a patient dies. Patients who require operations in groups A and B therefore need not be referred from the district hospital to the teaching hospital, which also diminishes the reputation of the district hospital. All large cities need one district hospital.

(5) Subspecialists should concentrate their time on group C and D operations, teaching surgical trainees, and supporting district hospital doctors.

(6) More use should be made of local, regional, and spinal anaesthesia, and these techniques should be taught to all district hospital doctors for use in most operations in groups A and B. Regional and spinal anaesthetic techniques are cheaper, more appropriate, and safe, provided they are carefully carried out.

(7) The district hospital doctor could be trained in two years as follows: three months' anaesthesia; six months' obstetrics and gynaecology; one year general surgery and orthopaedics; three months' option in urology, ophthalmology, or otolaryngology. This and two years of supervised experience in a district hospital should qualify the trainee for examination for a fellowship or master's degree in district hospital medicine.

To achieve the worthy aim "surgery for all by the year 2000"[9] responsibility for surgery cannot be confined to the surgeon with a conventional higher degree. General doctors must be taught and encouraged to perform surgery in district hospitals.

TABLE V—*Number of operations carried out in general surgery grouped by complexity**

	University Teaching Hospital	Monze	Mongu	Luampa	Solwezi	Chikankata	Chitokoloki
Group A:							
Simple biopsy	506	—	16	14	16	—	26
Wound repair	798	36	87	47	—	18	27
Foreign body removal	412	46	66	—	—	36	7
Abscess	2290	526	377	6	61	118	40
Chest drain	51	1	11	—	—	—	2
cut down	—	—	7	—	—	—	10
						—	
Group B:							
Skin graft	294	24		4		19	9
Sloughectomy	78	25				133	5
Perianal	272		21	2	12	10	1
Lump excision	796	2	59	15	42	49	10
Hernia	202		55	49	11	15	21
Appendix	100		6		8	2	
Burr holes	80		1				
Sigmoidoscopy	74						
Circumcision	266	17	43	87	51	3	50
Scrotal	70		20	10	10	12	
Amputation	126	24		5	14	11	9
Tongue tie	32						
Group C:							
Laparotomy†	258		30	12	30	20	9
Colostomy	20		7				
Stomach	20		4				
Gall bladder	14		1		1		
Breast	6	2					1
Thyroid	28	2					6
Oesophagoscopy	36						
Tracheostomy	28						
Incisional hernia	11		2	3			
Liver biopsy	—		7	1			
Hydrocephalus Shunt	66						
Group D:							
Flap surgery	20						3
Cleft lip	28						5
Release operations	18						3
Aortic aneurysm bypass graft	2 —						
Arteriovenous fistula	8						
Decortication	4						
Pneumonectomy	6						
Rib resection	12						
Anal atresia	20						
Total	7052	705	820	255	256	446	244

* Tables giving figures for operations in groups A-D for the subspecialties are available from the authors.
†In Monze 73 laparotomies were classified under obstetrics and gynaecology because reason for laparotomy was not specified in operation register.

We thank Ms R Spencer, Mr D Gaskell, and Drs A Watters, I Campbell, and J R Sinclair for providing some of the audit figures.

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(Accepted 27 July 1987)