

# South African General Surgeon Preparedness for Humanitarian Disasters

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## Abstract

**Background** Humanitarian medical organizations provide surgical care for a broad range of conditions including general surgical (GS), obstetric and gynecologic (OBGYN), orthopedic (ORTHO), and urologic (URO) conditions in unstable contexts. The most common humanitarian operation is cesarean section. The objective of this study was to identify the proportion of South African general surgeons who had operative experience and current competency in GS, OBGYN, ORTHO, and URO humanitarian operations in order to evaluate their potential for working in humanitarian disasters.

**Methods** This was a cross-sectional online survey of South African general surgeons administered from November 2017–July 2018. Rotations in OBGYN, ORTHO, and URO were quantified. Experience and competency in eighteen humanitarian operations were queried.

**Results** There were 154 SA general surgeon participants. Prior to starting general surgery (GS) residency, 129 (83%) had OBGYN, 125 (81%) ORTHO, and 84 (54%) URO experience. Experience and competency in humanitarian procedures by specialty included: 96% experience and 95% competency for GS, 71% experience and 51% competency for OBGYN, 77% experience and 66% competency for ORTHO, and 86% experience and 81% competency for URO. 82% reported training, and 51% competency in cesarean section.

**Conclusions** SA general surgeons are potentially well suited for humanitarian surgery. This study has shown that most SA general surgeons received training in OBGYN, ORTHO, and URO prior to residency and many maintain competence in the corresponding humanitarian operations. Other low- to middle-income countries may also have broad-based surgery training, and the potential for their surgeons to offer humanitarian assistance should be further investigated.

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## Introduction

Humanitarian disasters occur in unstable contexts such as conflict, natural disasters, and epidemics and require surgical care to treat traumatic injuries and other emergent surgical conditions [1]. During these crises, local governments may not be able to provide for the surge of surgical needs. International humanitarian medical organizations, such as Medecins Sans Frontieres (MSF), provide much of the surgical care in these contexts. In 2016, MSF provided over 100,000 lifesaving operations [2] almost exclusively in unstable resource-limited contexts, all in low- to middle-income countries (LMICs). The most common surgical procedures required in humanitarian surgery include emergency general surgery (GS), obstetric/gynecologic (OBGYN), orthopedic (ORTHO), and urologic (URO) operations [3].

MSF and other humanitarian medical agencies (HMA) that provide surgical care historically recruited surgeons from high-income countries (HICs) in Europe, North America, and Australia. Increasingly, these countries prepare their general surgeons to work in an environment of sub-specialization that may not be well matched for humanitarian surgical needs [4]. For example, the most common operation performed by MSF is cesarean section [3, 5] and most HIC general surgeons do not learn this procedure during their training. Also, pathologies in HICs may differ: 80% of HIC abdominal trauma is blunt, caused by road traffic accidents, and utilize non-operative management [6, 7], whereas in the humanitarian setting, traumatic abdominal trauma is usually penetrating, caused by intentional or unintentional injury especially in armed conflict settings, and requires surgery [8, 9]. In a recent publication, Lin and colleagues demonstrated that US general surgery residency did not provide the technical competency to work in humanitarian crises. In particular, there was not adequate training in emergency OBGYN, ORTHO, and URO procedures [10].

In addition, even if HIC surgeons have technical competency for humanitarian procedures, they may not be accustomed to making decisions and performing operations in the resource-limited conditions of the humanitarian context [11, 12]. For example, making diagnoses without diagnostic imaging may be unfamiliar. HIC surgeons may not be accustomed to diagnosing and managing postoperative complications such as anastomotic leaks and intra-abdominal abscess without access to laboratory and radiologic tests or expensive wound management systems. Therefore, recruitment of surgeons for humanitarian crises who trained in resource-limited countries may be more ideal than HIC surgeons.

South Africa (SA), an upper-middle-income country, has one of the highest surgeon densities in sub-Saharan Africa [13], although still significantly less than HICs (SA, 1.78 general surgeons per 100,000; USA, 7 per 100,000; and UK, 30 per 100,000) [14]. Unlike US medical students who enter into a residency immediately after graduation, SA doctors spend 2 years in internship and 1 year of community service before being allowed to specialize [15]. This time includes a mandatory 4 months in GS and OBGYN each. In addition, many SA doctors work as medical officers in a surgical field for several years before starting residency. Community service is often in a rural district hospital with limited resources not unlike a humanitarian setting. We hypothesized that SA general surgeons receive training in non-GS specialties such as OBGYN, ORTHO, and URO before their residency training, making them well prepared to work in humanitarian surgery. The objective of this study was to identify the proportion of SA general surgeons who had operative experience and current competency in humanitarian operations by GS, OBGYN, ORTHO, and URO.

## Methods

This was a cross-sectional online survey of South African (SA) general surgeons administered from November 2017–July 2018. An online link was given to SA general surgeons attending national surgical conferences in Cape Town and Johannesburg and e-mailed to members of professional societies. Inclusion criteria included surgeons who had completed or were currently registered in a general surgery training program in South Africa. We also included general surgery registrars in this survey since we expected their OBGYN, URO, and ORTHO experience to come before residency training. Surgeons who completed their general surgery residency in another country but who were working in South Africa were excluded. Convenience sampling was used. In 2014, there were 894 general surgeons registered with the Health Professionals Council of South Africa [14]. Approximately 25% of these were foreign trained [16], so we estimated the number of South African trained general surgeons to be 671. We aimed for a sample size of 20% or 134 surgeons.

Eighteen operations represent more than 95% of all MSF surgical procedures, and these were used to represent common humanitarian operations [3]. GS humanitarian procedures were abscess drainage and wound debridement, chest tube insertion, burns dressing, skin graft, resection of lipomas/cysts, hernia repair/minor anorectal procedures, emergency laparotomy, and repair/resection of bowel. We also included repair/resection of liver, spleen, and kidney even though this was not on the original MSF list. OBGYN

**Table 1** South African general surgeon characteristics

Total	<i>N</i> (%)
	154 (100)
Fully qualified surgeon	128 (83)
Registrar	26 (17)
Residency program	
Bloemfontein University	14 (9)
Pretoria University	17 (11)
Sefako Makgatho HSU <sup>a</sup>	4 (3)
University of Cape Town	50 (32)
University of KwaZulu-Natal	22 (14)
Stellenbosch University	23 (15)
University of the Witwatersrand	21 (14)
Walter Sisulu University	3 (2)
Pre-general surgery residency experience	
General surgery	
None	2 (1)
1–6 months	21 (14)
6–12 months	28 (18)
1–2 years	48 (32)
>2 years	53 (35)
Obstetrics and gynecology	
None	25 (16)
1–6 months	88 (57)
6–12 months	26 (17)
1–2 years	14 (9)
>2 years	1 (1)
Orthopedics	
None	29 (19)
1–6 months	89 (58)
6–12 months	25 (16)
1–2 years	9 (6)
>2 years	2 (1)
Urology	
None	70 (45)
1–6 months	69 (45)
6–12 months	13 (8)
1–2 years	2 (1)
>2 years	0 (0)

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procedures included episiotomy, dilation and curettage, removal of ectopic pregnancy, cesarean section, and hysterectomy. ORTHO procedures included fracture reduction, limb amputation, fasciotomy, and external fixation of fracture. URO procedures included hydrocele repair, suprapubic bladder catheterization, and bladder repair.

Self-reported experience and competency in the above procedures were queried. Experience in OBGYN, ORTHO, and URO was defined as at least 1–6 months of rotations in

that specialty. The number of months of OBGYN, ORTHO, and URO experience prior to GS residency was also quantified. Experience in a particular procedure was defined as being the primary surgeon. No case logs were used to verify self-reported results as these experiences were gained prior to GS residency. Competency was defined as feeling confident to perform the procedure as the primary surgeon. Interest in participating in a humanitarian mission was also elicited. The survey has been included as supplementary material (S1).

The online survey was administered through Research Electronic Data Capture (REDCap), a secure, Web-based application designed to support data capture for research studies. Data were exported in STATA 13 (College Park, TX, USA) for analysis. Descriptive statistics such as percentages and proportions were used. Ethical approval was given by the University of Cape Town Human Ethics Committee.

## Results

In total, there were 154 survey participants: 129 (83%) were fully qualified general surgeons and 26 (17%) were general surgery residents. There were graduates from each of the eight South African accredited general surgery programs (see Table 1). Prior to starting their general surgery residency, 129 (83%) had OBGYN, 125 (81%) ORTHO, and 84 (54%) URO experience, some for more than 6 months. Sixty-three (41%) had experience in all three of the non-GS specialties. Experience and competency in humanitarian procedures by specialty included: 96% experience and 95% competency for GS, 71% experience and 51% competency for OBGYN, 77% experience and 66% competency for ORTHO, and 86% experience and 81% competency for URO. Experience and competency in specific procedures are detailed in Table 2. Eighty-two percent reported training, and 51% competency in cesarean section. Competency in the top five humanitarian procedures is shown in Fig. 1. One hundred and four (68%) expressed interest on going on a humanitarian mission.

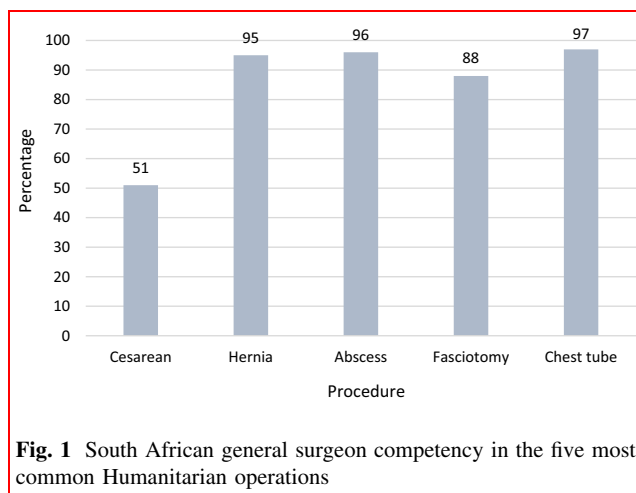
## Discussion

SA general surgeons are well trained to work in surgical humanitarian contexts. Unlike in some HICs such as the USA, SA doctors are required to have a minimum of 3 years of work experience prior to general surgery training. This study has shown that many SA general surgeons receive training in OBGYN, ORTHO, and URO prior to residency and many feel they retain competency in the

**Table 2** South African general surgeon experience and competency in common humanitarian operations

Procedure, N (%)	Experience	Competency
General surgery (average %)	96%	95%
Abscess drainage, wound debridement	150 (97)	148 (96)
Chest tube insertion	154 (100)	149 (97)
Burns dressing	151 (98)	145 (94)
Skin graft	146 (95)	146 (95)
Resection of lipomas/cysts	150 (97)	148 (96)
Hernia repair/minor anorectal <sup>a</sup>	148 (96)	146 (95)
Emergency laparotomy	150 (97)	149 (97)
Repair or resection of bowel	149 (97)	149 (97)
Repair or resection of liver, spleen, and kidney	142 (92)	142 (92)
Obstetrics/gynecology (average %)	71%	51%
Episiotomy	105 (68)	54 (35)
Dilation and curettage	111 (72)	73 (47)
Removal of ectopic pregnancy	119 (77)	111 (72)
Cesarean section	125 (82)	79 (51)
Hysterectomy	85 (55)	79 (51)
Orthopedic (average %)	77%	66%
Fracture reduction	126 (82)	89 (58)
Limb amputation	150 (97)	145 (94)
Fasciotomy	145 (94)	136 (88)
External fixation of fracture	56 (36)	36 (23)
Urology (average %)	86%	81%
Hydrocele repair	123 (80)	117 (76)
Suprapubic bladder catheterization	147 (95)	135 (88)
Bladder repair	127 (82)	123 (80)

<sup>a</sup>Includes anal sphincterotomy, anal fistulectomy/fistulotomy, hemorrhoidectomy



corresponding humanitarian operations. Not surprisingly, 95% of SA general surgeons sampled had experience and competency in GS humanitarian procedures. Experience and competency in non-GS procedures ranged from 51 to

86%. In the humanitarian setting, one out of every four procedures is cesarean section and over half of SA general surgeons reported being able to perform this procedure. Injury is an important indication for surgical care in humanitarian disasters, especially in settings of armed conflict and natural disasters [17]. While not specifically studied in this analysis, SA general surgeons likely have significant experience managing traumatic injuries because the SA burden is seven times higher than the global rate [18].

This study has limitations. Firstly, competency and experience were self-reported and not validated through case logs since these were not required during rotations prior to residency training. Secondly, since this survey was voluntary and did not ask about previous humanitarian experience, it is possible that those who were well trained in humanitarian operations or those interested going on a humanitarian mission were more likely to complete the survey.

In conclusion, SA general surgeons may be well prepared to work in humanitarian settings because of the breadth of their training in GS and non-GS humanitarian procedures. A high proportion expressed interest in working in the humanitarian context, four out of ten had experience in all three non-GS specialties, and one in four could perform a cesarean section, the most common humanitarian procedure. In the past, HIC surgeons were recruited to provide assistance to work in LMICs because of their perceived expertise. However, in the humanitarian context, surgeons trained in resourced-limited settings could be more useful given the appropriateness of training. Humanitarian surgeons are desperately needed, and SA general surgeons might be able to fill some of this void. Other LMICs may also have broad-based surgery training, and the potential for their surgeons to offer humanitarian assistance should be further investigated.

#### Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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