

# Surgical Training and Experience of Medical Officers in Ghana's District Hospitals

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## Abstract

### Purpose

To document the quality of training and experience of those who care for patients undergoing surgery and emergency obstetrical procedures at 10 government district hospitals in Ghana.

### Method

A study team composed of Ghanaian and U.S. surgeons visited 10 district hospitals in 10 different regions of Ghana in August 2009. On-site interviews were conducted documenting the formal and informal training and the experience of the medical officers (MOs) performing in surgical facilities in these hospitals.

### Results

Fourteen of the 17 MOs working at these facilities were available for interviews. All 14 had completed two years of housemanship, which is similar to a rotating internship. Only one had obtained any formal surgical training beyond the housemanship, although all were responsible for performing major surgical procedures. The formal training under qualified supervision during the housemanship was limited; the mean number of the most common major surgical procedures performed during training ranged from four to eight, depending on the procedure.

### Conclusions

Even though formal general surgical residency training in Ghana is well developed, graduates of these programs are not working in the district hospitals surveyed. The majority of surgical services provided at the district hospital are provided by MOs, who would benefit from more comprehensive training and ongoing supervision. To help meet the challenge of a shortage of physicians working at district hospitals, the authors present alternative approaches to care described in the literature that involve nonphysician midlevel health providers.

**E**mergency and essential surgical services at district hospitals are a crucial component in the strengthening of health

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systems in low- and middle-income countries (LMICs), but these services are often underdeveloped, particularly in Africa.<sup>1,2</sup> District hospitals and their necessary surgical services are a key link in the health systems of developing countries<sup>3</sup> and function as the first level of referral care for emergency care patients, many of whom require surgery. District hospitals are more accessible than regional hospitals, particularly for the poor, who lack the funds and the transport to access higher-level facilities.

LMICs bear a significant burden of the world's surgical and obstetrical conditions, which are estimated to account for 11% of the world's disability-adjusted life years lost each year.<sup>4</sup> Yet, only 3.5% of the world's surgical procedures are performed in the poorest countries, which have one-third of the world's population.<sup>5</sup>

Although the World Health Organization and other organizations are gathering data about the burden of surgical disease in terms of facilities, equipment, and availability of human resources, to our knowledge there were no studies that focused on the training and education of surgical providers at the district hospital level in the developing world.

Accordingly, we undertook this study to document the surgical training and experience of the medical officers (MOs) working in selected government district hospitals in one developing country.

### Method

The study team members (S.C., H.P., H.O., A.H., F. Abantanga, F. Abdullah) visited 10 government district hospitals in Ghana in August 2009. One government district hospital was selected from each of Ghana's 10 administrative regions: the Ashanti, Brong-Ahafo, Central, Eastern, Greater Accra, Northern, Upper East, Upper West, Volta, and Western regions. We judged these hospitals to be representative of the district hospitals in each region; also, they were accessible and available during the time allotted for data collection.

Following formal approval of the proposed study by the Ghana Health Service and the institutional review board of Johns Hopkins Medicine, the MOs at each hospital completed a questionnaire that we sent them prior to our visit. We designed the questionnaire, which focused on the education and training of surgical providers. We later visited each hospital, interviewed all of the available

17 hospital MOs who perform major surgical procedures, and reviewed the responses to the questionnaires, which had been completed before we arrived.

The questionnaire asked the name and location of the medical school attended by each MO, the year of graduation, formal surgery training received (including formal training in general surgery, obstetrics–gynecology, pediatric surgery, trauma surgery, and orthopedics surgery) and informal surgery training received (including obstetrics–gynecology, pediatric surgery, trauma surgery, and orthopedics surgery). In addition, the MOs were asked to report the number of procedures that they (1) had observed during formal training, (2) had performed under supervision while in formal training, (3) had performed as an MO during the previous four weeks, and (4) had performed in their careers for five procedures: appendectomy, inguinal hernia repair, exploratory laparotomy, cesarean section, and management of abortion or complications of abortion (D & C).

Either the hospital administrator or one of the MOs was asked to provide information about all the types and the total number of surgical procedures carried out in the hospital.

**Results**

The 10 district hospitals that we studied had the following characteristics:

- On average, there was one district hospital for every 106,545 people.

- Half of the district hospitals surveyed had only one MO.
- On average, there were only 1.6 MOs working at a district hospital for each 100,000 people in the catchment areas served by these facilities.
- Seven of the 10 hospitals had fewer than 100 beds.
- None of the 10 hospitals had a fully qualified surgeon who had completed a formal residency program.
- Altogether, the MOs at the 10 hospitals studied reported that they had performed 7,764 surgical procedures in 2008, 37% of which were major ones and the remainder minor. Among the 2,873 major procedures, 40% (1,135) were cesarean sections. The hospital also performed 9,600 normal deliveries. Overall, 269 major surgical procedures (including cesarean sections) were performed per 100,000 people in 2008.

Of the 17 MOs, we interviewed the 14 who were available. All 14 had completed medical school; half had attended medical school outside of the country. All had completed two years of housemanship, which is similar to a rotating internship. A housemanship typically consists of six months of surgery, six months of obstetrics–gynecology, six months of pediatrics, and six months of internal medicine. During the six-month housemanship in surgery, the MOs spend three months in general or pediatric surgery and then one month each in three subspecialties such as trauma, orthopedic surgery, urology, neurosurgery, or plastic and

reconstructive surgery. Only 1 of the 14 MOs had obtained any formal surgical training beyond the housemanship. He reported completing one year of general surgical residency training. Four of the 14 MOs reported obtaining significant informal or on-the-job training beyond the housemanship, an additional 2 reported obtaining informal training from qualified specialists, and another reported significant training from an experienced but unqualified specialist. (The terms *qualified* and *unqualified* in this context refer to whether a physician has completed full formal specialty training and certification.) Of the 14 MOs, 1 received informal training in the surgical specialties of pediatrics, trauma, and orthopedics; 5 received informal training in both trauma and orthopedics surgery, 1 in only orthopedics surgery, and 1 in pediatric surgery. The remaining 6 MOs had no training (other than self-directed training) beyond the housemanship. Five of the 14 MOs had been working at a district hospital for less than three years.

We asked the MOs about their training experience for five common types of surgical procedures. During their formal training, the highest mean number of surgical procedures (of the five types of procedures queried) that the MOs had performed under supervision was eight (for inguinal herniorrhaphy—see Table 1). During training, a much greater number of procedures were observed than were supervised when being performed.

Several of the MOs had the opportunity to improve their surgical skills after their formal training by later working directly with fully qualified or more experienced surgeons at a district hospital. Self-directed informal training after completion of their housemanship training was common. One MO, for example, reported that he relied on surgical textbooks for guidance and support while working at a district hospital.

Over the course of their careers, the MOs performed on average approximately two surgical procedures a week to manage abortions or complications of abortions, approximately one inguinal herniorrhaphy and one cesarean section a week, and one exploratory laparotomy and one appendectomy every two months (see

**Table 1**  
**Formal Training and Experience of 14 Medical Officers at 10 Government District Hospitals in Ghana, 2009**

Type of procedure	Mean number of procedures			
	Observed during training	Performed under supervision during training	Performed in the previous four weeks	Performed annually during one's career
Cesarean section	42	7	9	52
Exploratory laparotomy	26	5	0	7
Inguinal herniorrhaphy	23	8	7	65
Appendectomy	18	4	0	5
Management of abortion or complications of abortion (D & C)	15	7	5	98

related information in Table 1). All of the 10 district hospitals in our study had formally trained nurse anesthetists (most of whom had previously worked as nurses). They had the capacity to perform spinal anesthesia and, in some cases, general anesthesia, so the MOs did not have the responsibility for giving anesthesia (which many rural district MOs in other low-income countries have).

For the purpose of the analysis, we established a minimum training threshold for physicians providing surgical services at a district hospital. We set this threshold to be the following: observation of 20 procedures and performance of 10 under qualified supervision. The threshold for observation was met for eight (57%) or fewer of the MOs (depending on the procedure), and the threshold for performance of the procedure under supervision was met by five (36%) or fewer (again depending on the procedure). Broken down by procedure, this means that

- for cesarean sections, eight MOs (57.1%) were observed and five (35.7%) were supervised;
- for exploratory laparotomy, seven MOs (50.0%) were observed and three (21.4%) were supervised;
- for appendectomy, six MOs (42.9%) were observed and three (21.4%) were supervised; and
- for inguinal herniorrhaphy, six MOs (42.9%) were observed and three (21.4%) were supervised.

## Discussion

### Challenges to providing quality care

In this investigation, we aimed to document the postgraduate surgical education and training of MOs, who bear the responsibility of performing all the major surgical procedures in the 10 Ghanaian district hospitals studied. We found that MOs had limited experience in performing surgical procedures under qualified supervision during their housemanship, and none had performed more than eight of each type of surgical procedure prior to performing it independently. Only 1 of the 14 MOs participating in our study reported receiving additional formal general

surgical training after his housemanship, but this was for only one year as opposed to the three years needed to become a fully qualified general surgeon. Self-directed, on-the-job learning seemed to be the major component of surgical training for all MOs. One of the MOs, for instance, reported referring to basic surgical textbooks for guidance during his day-to-day work.

Previous studies about strengthening health systems through emergency and essential surgery services have focused on the availability of human resources and equipment of health facilities.<sup>6–8</sup> Strengthening the skills and knowledge base of surgical care providers is another critical step in improving the surgical capacities in Ghana as well as in many other African countries, because MOs without sufficient—or any—specialized training are responsible for providing surgical care in district hospitals.<sup>9</sup> It is often impractical for patients with surgical conditions arriving at these district hospitals to travel further to higher-level referral centers because of the cost and also because, oftentimes, these patients are too sick to be safely transferred.

There is a paucity of fully qualified surgeons and fully qualified physician anesthesiologists to care for patients in need of surgical and obstetrical services in many LMICs, particularly in Africa.<sup>9,10</sup> At present in Ghana, the West African College of Surgeons and the Ghana College of Physicians and Surgeons on average certify only 7 to 10 fully qualified surgeons each year.<sup>11</sup> In contrast, in the United States, the American Board of Surgery<sup>12</sup> certifies on average 1,004 general surgeons each year (this number does not include those who enter in a subspecialty such as orthopedics). There are an estimated 7.5 general surgeons per 100,000 people in the United States<sup>13</sup>; in Ghana, there are 0.2 general surgeons per 100,000 people. (The latter statistic is based on the number of general surgeons registered with the Ghana College of Physicians and Surgeons.)

The formal surgical residency training in Ghana consists of three years of clinical surgical rotations following a two-year housemanship.<sup>14</sup> Thus, those who are fully qualified to provide surgical care undergo a minimum of five years of formal clinical residency education, just

as U.S. residents do. The low number of qualified surgeons may help explain why there are only 269 major surgical procedures being performed for every 100,000 people in the surveyed hospital districts. Countries like the United States are estimated to perform at least 30 times more surgeries, with 11,110 surgeries per 100,000 people.<sup>15</sup>

In Tanzania, Uganda, and Mozambique, a recent cross-sectional survey of eight district hospitals in these countries demonstrated that none of the facilities surveyed had a formally qualified surgeon or physician anesthesiologist.<sup>9</sup> The investigators reported that provision of surgical care at these district hospitals is mostly undertaken by nurses with special surgical training.<sup>9</sup> In Malawi, there are no qualified surgeons in any of the country's district hospitals.<sup>10</sup> Surgical care in these facilities is typically provided by a team of 5 to 10 medical assistants (nonphysicians who have completed a two-year course and one year of internship), clinical officers (nonphysicians who have completed a three-year course and one year of internship), and one to two MOs (physicians who have completed a five-year course and 18 months of internship).<sup>16</sup> As far as we are aware, no minimum standards of surgical education and training for health personnel performing surgical procedures in low-resource settings have been established, even by official surgical societies,<sup>17–19</sup> nor are we aware of an evidence base on which such standards might be developed.

### Approaches to strengthen the quality of care

To confront the challenges of insufficient numbers of trained staff, there are several examples of approaches that already have been adopted to strengthen the quality of care provided to patients with surgical and emergency obstetrical conditions. One approach is to provide short-term training to those providing surgical services in district hospitals in developing countries. Experience with this approach has been reported by Médecins Sans Frontières (MSF) and the International Committee of the Red Cross (ICRC).<sup>20</sup> In these programs, MSF and ICRC surgeons working at district hospitals teach MOs basic surgical skills.<sup>20</sup> The programs have been implemented in Chad, the Democratic Republic of the Congo, and Somalia. However, there are no published

studies documenting the effectiveness of these programs. Because those who are providing the training are well-trained and highly experienced surgeons who have extensive experience working in difficult, low-resource settings, the quality of this training is likely to be quite good.

A one-year surgery training program for MOs who will later work in district hospitals in Niger has also been documented.<sup>21</sup> In this program, 41 MOs received three months of theoretical and practical training in basic surgery at a university hospital, and this was followed by nine months of supervised practical training requiring a certain number of procedures in each category at a regional hospital. After this year of training, each MO after beginning to work at a district hospital received six supervisory visits lasting two days each. Assessment of the quality of the surgical outcomes of a randomly selected sample of the district hospitals participating in the program showed that the mortality was 7% for emergency surgical cases and 0% for elective surgical cases, a marked improvement of the percentages before the training initiative. After two years, the number of referrals to higher-level facilities for surgery declined by 82%.<sup>21</sup> Surgeons from Montreal and the Ethiopian Ministry of Health conducted a six-month course for MOs, who were responsible for all surgical care at district hospitals in Ethiopia.<sup>22</sup> Major surgical procedures such as hernia repairs, appendectomies, cesarean sections, and hysterectomies were taught under the supervision of a specialist. After completion of the course, five of the seven MOs reported increasing the number of surgical procedures performed at district hospitals. This increase probably reflects the surgeons' greater confidence and improved skill sets in performing certain types of procedures.

A pilot program to increase the capacity of MOs to provide emergency comprehensive obstetrics–gynecology care at district hospitals has been reported from India, but in this case there was minimal training in surgical procedures.<sup>23</sup> This 16-week training program was piloted with 17 MOs. Limitations in anesthesia and blood bank support as well as in the hospital infrastructure made it difficult for most

of those trained to fully implement what they had learned.<sup>23</sup>

At this point in time in Ghana and many other African countries, it is not feasible for district hospitals to have a fully qualified surgeon available either part-time or full-time because of the scarcity of surgeons and the availability of better-paying positions in urban areas. The findings from our study demonstrate a relatively low turnover of MOs in the district hospitals we studied, with the average duration of employment time at their district hospital at the time of the interview being 3.5 years. In district hospitals in many other low-resource settings, individual MOs rarely stay more than one to two years. We speculate that the tenure of the Ghana MOs may be longer in the hospitals we surveyed because of their stronger sense of responsibility for providing care in these districts. In some countries, such as Malawi and Mozambique, there are still no physicians working at some of the district hospitals.

Alternative approaches are clearly needed; we have listed some promising ones below.

- One alternative approach is the provision of surgical training to nonphysician midlevel health providers who are from the hospital's geographic area and who desire to continue to work in that area for personal and family reasons. These types of training programs could also enroll MOs for short periods as well.
- Formal surgical training programs have been developed for nonphysicians who are usually experienced nurses, medical assistants, clinical officers, or assistant MOs, depending on the country.<sup>9</sup> For example, Malawi has established an orthopedic clinical officer program for the conservative management of the most common traumatic and nontraumatic musculoskeletal conditions.<sup>16</sup> The surgical component of this program includes debridement of open fractures and application of external fixators, wound debridement, care of tendon injuries, amputations for traumatic, vascular, and neoplastic conditions, treatment of burn injuries (including skin grafting), and management of minor soft tissue injuries and tumors.<sup>16</sup>

- In Mozambique, midlevel providers undergo an additional two years of training at a teaching hospital and one year of internship at a provincial hospital.<sup>24</sup> These midlevel surgical technicians perform 92% of the major obstetrical surgical procedures at district hospitals, including cesarean sections, hysterectomies for obstetrical complications, and exploratory laparotomies for suspected ectopic pregnancies.<sup>24</sup> There is evidence that midlevel surgical technicians can provide good-quality surgical care in district-level facilities. In Malawi, for example, low mortality and morbidity rates have been reported for cesarean sections performed by midlevel surgical technicians at district hospitals.<sup>25</sup> In Tanzania at rural, district hospitals, the surgical outcomes for patients operated on by midlevel surgical technicians are as good as the outcomes of patients operated on by MOs.<sup>26</sup>

Given these outcomes, midlevel surgical technicians are an especially attractive alternative, particularly because of their long-term stability in the area. The potential role of physician extenders such as physician assistants (PAs) in low-resource settings in developing countries, including the strengthening of surgical services in district hospitals, remains promising. In the United States, PAs have already been successfully integrated in the surgical care team<sup>27–30</sup> and have been essential in filling the gap that resulted from the reduction of work hours for U.S. surgical residents. Thus, the demand for surgical PAs is likely to continue to grow for the foreseeable future.<sup>31</sup>

#### Limitations of this study and suggestions for future research

A major limitation of our study is that we did not have the capacity to directly assess the quality of surgical care provided to patients at these facilities. In addition, only 10 of Ghana's 124 district hospitals were included. We cannot be certain that the hospitals included in our study are representative of all district hospitals in Ghana, but we believe that we have obtained a representative picture of the situation in district-level hospitals in that country, even if the most isolated and difficult-to-reach district hospitals are underrepresented in our sample.

Further research is needed to specify in greater detail how MOs spend their time

and the nature of their surgical and nonsurgical workload. Further insights are needed from MOs about what types of training and education were most helpful to them and what approaches they think would be most useful in improving their surgical expertise and the quality of surgical care at district hospitals. With this more complete picture, it should be possible to begin to formulate some practical approaches to improving surgical services for patients in district hospitals in Ghana.

## Conclusions

MOs provide all the surgical care in district hospitals in Ghana. Graduates of the formal surgical residency programs in Ghana are not working at district hospitals. Leaders of academic surgery in developing countries as well as those responsible for district-level hospital services in those countries need to endorse new approaches to improving the surgical training of MOs that will increase the accessibility of high-quality surgical services to those who need them in an affordable and sustainable manner. These new approaches might include a short training course to better equip MOs to manage the surgical challenges they face. We hope that the findings from this study can provide policy makers additional data to chart the path to the future of improved access and availability to surgical care in Ghana and elsewhere.

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