A Decade of Surgery Aboard the U.S. Naval Ship COMFORT (T-AH 20)

CDR Tamara J. Worlton, MD, FACS[*,†]; *CPT Rathnayaka MKD Gunasingha, MD*[†]; *LCDR Rex Atwood, MD*[†]; *CDR Mark Johnson, MD, FACS*[‡]; *CDR Ian C. Uber, MD*[§]

ABSTRACT

Introduction:
The U.S. Naval Ship COMFORT has performed six humanitarian assistance and disaster relief mission since 2007. This paper describes the surgical volume per surgical specialty for five missions spanning 19 countries.

Materials and Methods:
Raw surgical case logs were analyzed for total case volume, total operating days, unanticipated return to operating room, and percentage of pediatric cases (<18 years old) for each country visited.

Results:
Total surgical volume for the five missions was 5,142. The countries most frequently visited were Columbia and Haiti with seven and five visits, respectively. General surgery, ophthalmology, and plastic surgery have had consistent volume over time. Orthopedic surgery volume has steadily decreased with the exception of the 2018 mission.

Conclusion:
As volume in military treatment facilities declines, alternative sources of surgical volume for military surgeons are being examined. This paper highlights the historical volume which can inform future personnel planning requirements of U.S. Naval Ship COMFORT missions. With the exception of orthopedic surgery, surgical volume has remained consistent over the last decade. For future best practice, historical case data should be used to determine staffing needs on hospital ships and case logs and operating procedures and follow-up protocols should be standardized.

BACKGROUND

The U.S. Naval Ship (USNS) COMFORT was commissioned as a hospital ship in 1987. Although hospital ships are primarily intended to serve as a combat support platform, they are most frequently used in humanitarian assistance and disaster relief.[1–3] In 2007, the U.S. Southern Command introduced Continuing Promise which is a training mission intended to strengthen partnerships and cooperation between the USA and partner nations (PN) through medical, dental, veterinary, and other humanitarian assistance activities.[4,5]

The USNS COMFORT has completed six Continuing Promise missions since 2007.[4] Direct patient care is a key component of the USNS COMFORT mission and is the most expansive surgical care global health engagement (GHE) in the Department of Defense (DoD). Publications looking at comprehensive surgical volume for the 2007, 2015, and 2018 missions and specialized surgical volume for 2009 and 2011 have already been published.[6–10] We are unaware of any publications that have examined overall volume in the context of previous missions. This paper provides comprehensive surgical case volume over different time frames with different PNs for numerous USNS COMFORT surgical missions. The ship has also responded to numerous disasters to include the 9/11 response in New York City, Hurricane Katrina in New Orleans, the 2010 earthquake in Haiti, Hurricane Maria in Puerto Rico, and the COVID-19 response in New York City.[3,18] The planning and execution of these missions are very different from the humanitarian assistance missions, and therefore, are not included in this paper.

In the context of decreasing surgical volume in military treatment facilities, alternative methods of increasing individual surgeon case volume are being examined.[11,12] Surgical case volume is necessary for combat support readiness. This paper elucidates trends for each surgical specialty involved in

[*]Department of Surgery, Uniformed Services University of the Health Sciences, Bethesda, MD 20889, USA
[†]Department of Surgery, Walter Reed National Military Medical Center, Bethesda, MD 20889, USA
[‡]Department of General Surgery, Navy Medicine Readiness and Training Command, Portsmouth, VA 23708, USA
[§]Department of Ophthalmology, Navy Medicine Readiness and Training Command, Portsmouth, VA 23708, USA

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the United States Government. We are military service members. This work was prepared as part of our official duties. Title 17 U.S.C. 105 provides that "Copyright protection under this title is not available for any work of the United States Government." Title 17 U.S.C. 101 defines a United States Government work as a work prepared by a military service member or employee of the United States Government as part of that person's official duties.

The opinions or assertions contained herein are the private ones of the author/speaker and are not to be construed as official or reflecting the views of the Department of Defense, the Uniformed Services University of the Health Sciences or any other agency of the U.S. Government.

doi:https://doi.org/10.1093/milmed/usac278

these expansive missions for the purpose of informing mission planners of the personnel that are most likely to benefit from participation in future missions.

Additionally, this data provide some background to discuss the impact on PN surgeons and health care systems, such as loss of certain cases and potential income to those on the ship, through direct patient care missions. An important component of DoD GHE is examining the capability and stability of a nation's health infrastructure, and it is imperative to examine these missions in this context and how partnerships can be developed in addition to the surgical readiness mission.[13–15]

METHODS

After approval from the Institutional Review Board at Naval Medical Center Portsmouth, a retrospective review of surgical procedures aboard the USNS COMFORT was conducted. Surgical case logs were available from 2009, 2011, 2015, 2018, and 2019. Additionally, publications pertaining to surgical cases from Continuing Promise missions were reviewed.[5–9] The data were independently analyzed by two authors, TW and KG, to ensure consistent and accurate counts. Total case volume, total operating days, number of surgeons participating in the mission, and percentage of pediatric (<18 years old) for each PN visited were recorded.

Cases related to multiple specialties, for example, cleft lip, were counted for the primary surgeon's specialty. Pediatric cases were recorded by patient age and not by specialty as these cases crossed multiple specialties. Cases were labeled as the specialty of the surgeon. For example, if an urologist performed an inguinal hernia repair this would be counted as a urology case and not a general surgery case. Complications, including unanticipated return to operating room (OR), were noted.

This paper used the Standards for Reporting Qualitative Research (SRQR) checklist.[16]

RESULTS

Surgical missions took place in 2009, 2011, 2015, 2018, and 2019 with a total of 19 distinct countries visited within the USSOUTCOM Area of Responsibility (see Table I). Total surgical volume for years with available case logs was 5,142. The number of operative days per city ranged from 4 to 9 with an average of 6.3 days.

The surgical specialties represented on the USNS COMFORT have varied over time with general surgery, orthopedic surgery, plastic surgery, oral and maxillofacial surgery, and Ophthalmology present on every mission (see Table II). The surgical case logs from 2007 were unobtainable and were not included in this paper. In a study by Hartgeril et al, the total 2007 mission surgical volume was 1,163, leading to a total of 6,305 surgeries for all Continuing Promise missions.[6] Surgical volume for each specialty per mission year is presented in Table III. Specialty surgical cases were diverse in nature, and the single mission with the most cases per specialty was: general surgery with 92 cases in Panama 2009, ophthalmology with 65 cases in Honduras 2018, urology with 26 cases in Costa Rica in 2011, plastic surgery with 24 cases in Colombia 2019, gynecology with 21 cases in Nicaragua 2009, orthopedic surgery with 18 cases in Dominican Republic 2009, otolaryngology with 18 cases in Jamaica 2015, and oral and maxillofacial surgery with 16 cases in Colombia 2009 (see Table IV).

There was limited information about non-operative complications or follow-up of surgical patients. The case logs were reviewed for patients with return trips to the OR. There were documented unanticipated return to the OR cases in 2009, 2011, 2015, 2018, and 2019 at a rate of 0.35%, 0.18%, 0.41%, 0.17%, and 0.74% respectively. The most common cause for return to OR was evacuation of a hematoma after inguinal hernia repair ($n = 7$). Other unanticipated return to OR cases were cataract revision ($n = 2$), hysterectomy after dilation and curettage ($n = 1$), intraocular lens reposition and wound repair ($n = 1$), hypotony reversal after cataract ($n = 1$), revision inguinal hernia ($n = 1$), eye washout after cataract ($n = 1$), exploratory laparotomy and bladder laceration repair after hysterectomy ($n = 1$) and after inguinal hernia repair ($n = 1$). Some complications did not require a return trip to the OR, but were recorded. For example, in 2009, a pediatric patient had a laryngospasm on induction, and the case was cancelled. Missions within 2015 had the most thorough documentation and the logs noted the following nonoperative complications; postoperative urinary retention ($n = 7$), unplanned need for blood transfusion ($n = 3$), hematoma nonoperative ($n = 2$), monitoring for angioedema ($n = 1$), postoperative ileus ($n = 1$), unplanned spermatic cord transection ($n = 1$), unintentional cystostomy ($n = 1$), and reintubation and ICU admission ($n = 1$). In 2018, there was documentation of admission to ICU for inverted T waves ($n = 1$), surgery aborted (no reason given) and admission to the ICU for an anesthesia reaction ($n = 1$). In 2019, there was an ICU admission for suspected malignant hyperthermia and an unanticipated prolonged ICU stay for pediatric airway monitoring.

DISCUSSION

This paper seeks to give the most thorough information from a decade of humanitarian assistance missions conducted by the USNS COMFORT about all surgical specialties from the available surgical logs. Surgical specialty representation on the mission should be based on a number of factors, to include overall mission parameters and limitations on staffing because of other military requirements. The hospital ship is primarily intended for combat support; however, this type of deployment for the hospital ships is rare; the last mission was during Operation Iraqi Freedom in 2003.[2,17]

The information presented here should aid logistical planning for surgical supplies based on the countries on the mission. General surgery and ophthalmology have consistently

TABLE I. Countries visited each year

Country	Year (number of cases)				
	2009	2011	2015	2018	2019
Antigua	X (141)				
Belize			X (98)	X (116)	
Columbia	X (205)	X (126)	X (106)	X (137)	X (114)
Costa Rica		X (159)			X (119)
Dominica			X (120)		
Dominican Republic	X (171)		X (106)		X (89)
Ecuador		X (128)		X (95)	X (109)
El Salvador	X (166)	X (131)	X (98)		
Grenada					X (90)
Guatemala		X (125)	X (102)		
Haiti	X (130)	X (100)	X (110)		X (60)
Honduras			X (117)	X (159)	
Jamaica		X (123)	X (106)		X (89)
Nicaragua	X (165)	X (109)	X (108)		
Panama	X (160)		X (126)		X (135)
Peru		X (106)		X (106)	X (95)
St Kitts and Nevis					X (23)
St Lucia					X (60)
Trinidad and Tobago					X (104)

TABLE II. Number of Surgeons by Specialty on Each Mission Year (Estimated)

	2009	2011	2015	2018	2019	Total (by specialty)
General surgeons	6	2	4	4	3	19
Gynecologists	2	1	2	0	0	10
Ophthalmologists	3	2	1	3	3	12
Oral maxillofacial surgeons	1	1	1	2	2	7
Orthopedic surgeons	2	2	2	1	1	8
Otorhinolaryngologists	1	3	1	0	0	5
Pediatric surgeons	1	1	1	1	1	5
Plastics and reconstructive surgeons	1	1	1	1	1	5
Urologists	2	1	1	0	1	5
Total (by year)	19	14	14	12	12	

TABLE III. Total Volume per Specialty per Year

	2009	2011	2015	2018	2019
Operating days	47	71	84	29	69
Total mission time	4 months	5 months	6 months	3 months	5 months
Specialties					
General surgery	506	259	435	265	462
Gynecology	115	63	122	0	0
Ophthalmology	199	312	201	211	412
Otolaryngology	55	98	78	0	0
Oral maxillofacial surgery	49	68	75	38	12
Orthopedic surgery	81	94	98	29	22
Plastic surgery	74	117	129	54	143
Urology	59	100	56	0	51
Total	1,138	1,111	1,194	597	1,102
Return to operating room rate	0.35%	0.18%	0.41%	0.17%	0.74%
% Pediatric cases (age <18 years old)[a]	29.6%	23.7%	19.7%	22.6%	16.1%

[a]Inclusive of all subspecialties.

maintained a high number of cases on these missions, noting a need for surgeons of these specialties for the missions. It is also important to note that some specialties have a low number of cases while on the mission. This would be an additional

TABLE IV. Number of Cases per Country

Country	Number of visits	ENT	General surgery	Gynecology	Oral and maxillofacial surgery	Ophthalmology	Orthopedics	Plastic surgery	Urology	Total
Antigua	1	8	49	15	12	34	9	6	8	141
Belize	1	16	24	18	6	11	9	8	6	98
Colombia	6	30	300	31	54	218	56	88	27	804
Costa Rica	2	13	100	7	14	94	13	11	26	278
Dominica	1	6	43	12	15	15	10	15	4	120
Dominican Republic	3	17	143	27	15	66	33	40	25	366
Ecuador	3	12	119	6	10	129	11	31	14	332
El Salvador	3	30	132	26	28	108	19	37	15	395
Grenada	1	0	28	0	0	43	1	15	3	90
Guatemala	2	19	71	14	10	50	22	32	9	227
Haiti	4	17	156	34	15	36	37	54	51	400
Honduras	2	4	110	5	15	89	23	24	6	276
Jamaica	3	30	93	30	8	108	8	22	19	318
Nicaragua	3	16	151	36	13	98	23	36	9	382
Panama	3	4	202	34	14	81	28	37	21	421
Peru	3	9	136	5	13	85	16	34	9	307
St. Kitts & Nevis	1	0	6	0	0	11	2	1	3	23
St. Lucia	1	0	26	0	0	21	1	7	5	60
Trinidad & Tobago	1	0	38	0	0	38	3	19	6	104
Total		231	1,927	300	242	1,335	324	517	266	

hit for combat support readiness on top of being away from their primary practice. This information in conjunction with screening patients for an upcoming mission should be used to optimize the number and types of surgeons deployed. This information can also be used to deploy surgeons to countries as needed as opposed to staying on board the ship through countries with a limited surgical need. This type of judicial manning would increase the individual surgeon's case volume as time on the ship without operating would be limited, and surgeons could continue their military treatment facilities based practice longer. For example, the orthopedic surgeon onboard in 2019 completed 22 cases, but spent 5 months away from their regular surgical practice. Partnerships with non-governmental organizations and local surgeons in the PN can help filling staffing gaps on the ship and can increase capability and strengthen the relationship with the PN. Patient screening and surgical follow-up can also be established with local surgeons that are there for a longer term. Concurrent use of local hospitals for surgeries would allow for easier patient follow-up care in addition to the opportunity for all surgical team members to meet their colleagues and form relationships.

An additional surgical readiness benefit of these missions is the opportunity for surgeons to gain diverse experience by participating in surgeries outside of their primary specialty. As most cases have more than one attending surgeon operating, there is the opportunity to learn in a safe, controlled environment. In 2019, there was a single surgeon for each of the following specialties: urology, orthopedics, plastic surgery, and pediatric surgery, therefore, there was ample opportunity for other specialties to assist. This type of experience could potentially be beneficial for surgeons deployed in remote and austere environments without immediate access to subspecialty surgical care.

GHE has been discussed as a potential avenue for increasing case volume for military surgeons, which is a key component of readiness, but requires an assessment on the potential for unintended impact on the PN health care system.[19–21] First, the lack of an organized method of follow-up and reporting surgical complications has been commented on in multiple papers.[6–10,22] Not every complication requires an immediate unanticipated return to the OR, and so the understanding of postoperative complications for this mission is extremely limited. It is unknown what this burden is on the PN after the hospital ship has left port. As mentioned above, partnerships with PN hospitals, surgeons, and local non-governmental organizations could solve the issue of unorganized patient follow up.

Secondly, although every effort is made to have adequate pre-mission planning, there are limitations that impact the surgical mission. For example, in 2019, the pre-deployment site survey had less than 2 months for planning.[22] Surgical case recruitment stems from the pre-deployment site survey communicating the hospital ship capabilities to PN, as their early involvement can directly impact surgical volume. The inability to identify gaps in PN surgical subspecialty capability, combined with the very short time in country, leads to decreased complexity in the recruited surgical cases and missed opportunity for expertise exchanges, negatively impacting both the surgical readiness and strengthening of the PN mission. As an example, there were PN requests in 2019 for bariatric surgery, cardiothoracic surgery, and transplant

surgery that were unable to be met either because of the PN not knowing it was available until too late to recruit patients (bariatric surgery) or not identifying early enough to include these experts in the country specific mission (cardiothoracic and transplant surgeries).

Short-term surgical missions can improve access to care, particularly for complex patients, when there is inclusion of local surgeons.[23–25] It is difficult to plan for the unintended consequences of a massive direct patient care mission, where local provider perspective is desperately needed. This perspective includes displacement of local health care providers as well as long-term complications that may arise from these types of missions. Inclusion of PN surgeons is a necessary component of long-term follow up of patients, subject matter expert exchanges, and avoiding inadvertently negatively impacting the local health care system. Also, when PN surgeons operate on the ship, they have the opportunity to use techniques and technology that may not be readily available.[26]

Planning for surgical missions is extremely complicated and has to meet the needs of the U.S. Government, the PN government, active duty personnel on the ship, local and active duty surgeons, PN patients, in addition to many other stakeholders. Manning requirements of the ship are mission based; however, trauma-relevant personnel are relatively inflexible. Although the ship is manned to be "trauma-ready," those surgeons may never see a trauma while on the ship, and paradoxically, have decreased readiness for trauma. Solutions may be sending the trauma and orthopedic surgeons to work with local surgeons and hospitals that get trauma patients or altering the manning requirements to shorter deployments so not to be away from their primary practice. The combatant command, in addition to ensuring that relationships with PNs and increasing security cooperation should consistently include PN medical staff in the planning process. PN medical staff would be able to help offload personnel requirements, guarantee appropriate follow up for patients, and help with local logistics. Current needs and data from the PN in addition to prior surgical case volume can be used further to determine staffing and logistic requirements. In addition to overall mission planning, surgery focused planning is crucial in ensuring there is a need for a particular surgeon to be on the ship. The PN is mainly responsible for screening surgical patients and logistical limitations, such as the length of the planning cycle and lack of surgeons from either side in the planning process, limit how effective a mission can be for surgeon readiness.

The total case volume reported in this paper may be different from published papers, which we attribute to our exclusion of endoscopy and interventional radiology cases conducted in the main OR. Additionally, we did not count procedures as separate if done in the same case. For example, a hydrocelectomy and inguinal hernia repair counted as one case. Another cause of potential discrepancy is that the case was attributed to the specialty of the primary surgeon and not based on the type a case. This was done because readiness is determined by individual surgeon volume. A limitation with reporting how many surgeons participated in missions was the recording of primary surgeon in the raw case logs. Sometimes a surgical resident was recorded as primary surgeon, which made it appear like more surgeons were onboard throughout the mission. This was addressed by contacting surgeons present on the mission to verify who was on the mission but is limited by recall bias. Some specialties switched out surgical teams during the mission and attempts were made to ensure recording the total number at one time onboard and not the total for the whole mission.

Another limitation is the accuracy of the information. The case logs from these missions are not part of an electronic health record nor are they kept in a standardized fashion from year to year. It is highly recommended that for future missions, a consistent and thorough surgical log is developed and maintained. Standard Form 516 is filled out for each case and maintained in a paper patient chart, but it is recommended that all this data are included in an electronic record as well.[27] Additionally, it is imperative to use current procedural terminology (CPT) codes. It is also recommended that demographic information of the patient should be maintained in the log to attempt contact for distant follow up. Complications should also be recorded in the log whether or not they require an unanticipated return to the OR. If shipboard information technology systems allow, this should be transferred to a centralized registry to be audited to give feedback to mission commanders. Ideally, this information should also be made available to the PN Ministry of Health.

Future research should examine specific surgical specialty case logs using the Knowledge, Skills, and Abilities (KSA) Clinical Readiness Program to be able to comment on its impact on individual surgeon readiness.[28] The lack of CPT codes in current surgical logs makes calculation of KSAs for surgeon readiness difficult. It is highly recommended that CPT codes for all cases are noted in surgical logs henceforth.

CONCLUSION

This compilation of USNS COMFORT surgical cases shows consistent surgical volume for General Surgery, Ophthalmology, and Plastic and Reconstructive Surgery over the last decade. Based on the decreasing surgical volume for Orthopedic Surgery, future mission planners should consider only deploying an Orthopedic Surgeon to specific countries for pre-identified cases. Future direct patient care GHE missions should incorporate standardized medical records, conscientious patient follow-up and inclusion of PN surgeons and hospitals.

ACKNOWLEDGMENTS

The authors would like to acknowledge Michael Bushey, BSN, RN, CNOR and Eva Chou, MD, USN, MC.

FUNDING

None declared.

CONFLICT OF INTEREST STATEMENT

None declared.

REFERENCES

1. US Navy USNS Comfort (T-AH 20). Available at https://www.navysite.de/ships/comfort.htm; accessed September 26, 2022.
2. USNS COMFORT History. Available at https://www.msc.usff.navy.mil/Ships/Comfort/History/; accessed September 26, 2022.
3. Worlton T, Uber I, Bronaugh S, et al: USNS COMFORT (T-AH 20) surgical services response to the COVID-19 pandemic in New York City. Ann Surg 2020; 272(4): e269–71. 10.1097/SLA.0000000000004320.
4. US Southern Command. Continuing Promise 2018. Enduring Promise for the Americas. May 2019. Available at https://www.southcom.mil/Media/Special-Coverage/Continuing-Promise-2018/; accessed September 26, 2022.
5. Faller C. United States Southern Command Strategy: Enduring promise for the Americas. Available at https://www.southcom.mil/Portals/7/Documents/SOUTHCOM_Strategy_2019.pdf?ver=2019-05-15-131647-353, published May 8, 2019; accessed September 26, 2022.
6. Hartgerink BJ, Chapman LE, Stevenson J, Donahue TF, Pagliara C: Utilization of surgical resources during the USNS COMFORT humanitarian mission to the Americas, June to October 2007. Mil Med 2010; 175(9): 638–46. 10.7205/MILMED-D-09-00162.
7. Fluke LM, Restrepo RD, Pryor HI, Duncan JE, Mann KE: The surgical experience Aboard USNS COMFORT (T-AH-20) during operation continuing promise 2015. Am Surg 2018; 84(8): 1307–11. 10.1177/000313481808400842.
8. Chadwick JL, Sridhara S, Goodrich J, Mitchell AO, Gessler EM: Humanitarian otolaryngology: a navy hospital ship experience. Otolaryngol Head Neck Surg 2014; 151(6): 960–2. 10.1177/0194599814549159.
9. Norris EA, Johnson MS, Mann KE, Pryor HI: Evaluation of surgical caseload aboard the USNS COMFORT (T-AH 20) during enduring promise 2018. Mil Med 2020; 185(3-4): 325–7. 10.1093/milmed/usz416.
10. Walk RM, Glaser J, Marmon LM, Donahue TF, Bastien J, Safford SD: Continuing promise 2009—assessment of a recent pediatric surgical humanitarian mission. J Pediatr Surg 2012; 47(4): 652–7. 10.1016/j.jpedsurg.2011.09.063.
11. Walk RM, Donahue TF, Stockinger Z, et al: Haitian earthquake relief: disaster response aboard the USNS comfort. Disaster Med Public Health Prep 2012; 6(4): 370–7. 10.1001/DMP.2012.67.
12. Haag A, Cone EB, Wun J, et al: Trends in surgical volume in the military health system—a potential threat to mission readiness. Mil Med 2021; 186(7–8): 646–50. 10.1093/MILMED/USAA543.
13. Dalton MK, Remick KN, Mathias M, et al: Analysis of surgical volume in military medical treatment facilities and clinical combat readiness of US Military surgeons. JAMA Surg 2022; 157(1): 43–50. 10.1001/JAMASURG.2021.5331.
14. Callahan RP, The US: Must embrace partner-led global health engagement. Mil Med 2021;186(3–4): 67–9. 10.1093/MILMED/USAA390.
15. Koehlmoos T, Kimsey L, Bishai D, Lane D: The imperative for a health systems approach to global health engagement advancing policy on research for health view project tricare view project. Jt Force Q 2017; 84(1): 107.
16. Policy O of the US of D for DoD Instruction 2000.30 Global Health Engagement (GHE) Activities. Available at https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/200030_dodi_2017.pdf#:~:text=DODINSTRUCTION2000.30GLOBALHEALTHENGAGEMENT%28GHE%29ACTIVITIES,ofGHEactivitieswithpartnernation%28PN%29entities.
17. The EQUATOR Network: Standards for reporting qualitative research: a synthesis of recommendations. Available at https://www.equator-network.org/reporting-guidelines/srqr/; accessed September 27, 2022.
18. Brantley M: From the USNS Comfort: a nurse's wartime journal. Am J Nurs 2003; 103(6): 100–3. 10.1097/00000446-200306000-00041.
19. Tadlock MD, Carr M, Diaz J, et al: How to maintain the readiness of forward deployed caregivers. J Trauma Acute Care Surg 2021; 90(5): E87–94. 10.1097/TA.0000000000003054.
20. Charron BL, Dengler KL, Nguyen BT, Coggins A, Massengill JC, Tomkins TJ: Gynecologic SURGRETE, New Horizons Guyana 2019: an experience of a lifetime for global health engagement and medical readiness. Mil Med 2020. 10.1093/MILMED/USAA169.
21. Worlton TJ, Waller SG, Saint Laurent S, Remick K, Malone DL, Elster EA: Important and often forgotten aspects of surgical GHE: a response to "Gynecologic SURGRETE, New Horizons Guyana 2019: an experience of a lifetime for global health engagement and medical readiness. Mil Med 2021;186(3–4): 89–90. 10.1093/MILMED/USAA456.
22. Younger A, Worlton TJ, Wallace S, Allan Steigleman W, Ortiz-Pomales Y: Ethical considerations for surgical planners from the lessons learned on USNS COMFORT (T-AH 20) Deployment 2019. Mil Med 2021;186(5–6): 117–20. 10.1093/MILMED/USAA407.
23. Licina DJ, Licina D: Hospital ships adrift? Part 1: a systematic literature review characterizing US Navy hospital ship humanitarian and disaster response, 2004–2012. Prehosp Disaster Med 2004;28(3): 230–8. 10.1017/S1049023X13000149.
24. Coughran AJ, Merrell SB, Pineda C, Sceats LA, Yang GP, Morris AM: Local and visiting physician perspectives on short term surgical missions in guatemala: a qualitative study. Ann Surg 2021;273(3): 606–12. 10.1097/SLA.0000000000003292.
25. Al-Hadidi A, Alslaim H, Ghawanmeh M, et al: Short-term surgical trips: local collaboration and its effects on complications and patient satisfaction. Pediatr Surg Int 2020; 36(8): 977–81. 10.1007/S00383-020-04667-3.
26. Worlton TJ, Braden J, Gadbois K, Lefringhouse J, Lockrow E: The impact of robotic-assisted technology on attitudes of host nation individuals participating in pacific partnership 2018: improving partnerships through technology. Mil Med 2020;185(5–6): 368–70. 10.1093/MILMED/USZ439.
27. Standard form 516. Available at https://www.gsa.gov/forms-library/medical-record-operation-report; accessed September 27, 2022.
28. Holt DB, Hueman MT, Jaffin J, et al: Clinical readiness program: refocusing the military health system. Mil Med 2021; 186(Suppl 1): 32–9. 10.1093/MILMED/USAA385.