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ORIGINAL ARTICLE

The development and roll-out of a new hydrocoele surgery facility assessment tool for the elimination of lymphatic filariasis

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A hydrocoele surgery facility assessment tool (HSFAT) was developed to assess the readiness of hydrocoele surgery services in health facilities prior to implementation of hydrocoele surgical campaigns for the elimination of lymphatic filariasis (LF). A first version of the tool was piloted in Bangladesh, Malawi and Nepal in 2019, then, following feedback from country programme managers, a second version of the tool was rolled out across countries implementing hydrocoele surgery in the Accelerating the Control of Neglected Tropical Diseases (Ascend) West and Central Africa Programme, including Benin, Burkina Faso, Ghana, Guinea, Niger and Nigeria. The HSFAT assessed facilities across 10 domains: background information, essential amenities, emergency patient transfer, laboratory capacity, surgical procedures and trained staff, infection prevention, non-disposable basic equipment, disposable basic equipment, essential medicines and current hydrocoele practices. The HSFAT results highlight key areas for improvement in different countries and can be used to develop a quality improvement plan, which may include actions with agreed deadlines to improve the readiness and quality of hydrocoele surgery services provided by the health facility, prior to implementation of surgical campaigns and assist country programmes to achieve the dossier requirements set out by the World Health Organization for the elimination of LF.

Keywords: hydrocelectomy, hydrocoele, lymphatic filariasis, surgery.

Introduction

Lymphatic filariasis (LF) is a parasitic disease transmitted by mosquitoes. Infection with LF damages the lymphatic system, resulting in visible manifestations of the disease, most commonly lymphoedema (tissue swelling of the limbs) and hydrocoele (scrotal swelling). An estimated 36 million people globally have these conditions, which, without treatment, can result in permanent disability and impose a significant economic and psychosocial impact on both patients and their families.[1,2]

In 1997, as a result of the significant public health burden, the World Health Assembly resolved to eliminate LF as a public health problem.[3] To achieve this, the Global Programme to Eliminate LF (GPELF) was launched in 2000, with a strategy based on two key components: stop the spread of infection through annual mass administration of a combination of antifilarial drugs to entire populations at risk and alleviate the suffering caused by LF through provision of the recommended essential package of care for morbidity management and disability prevention (MMDP).[2]

The recommended essential package of care includes access to services to manage lymphoedema and to prevent both progression and painful episodes of adenolymphangitis (inflammation of the lymph vessels or glands often accompanied by pain, fever and swelling) and access to hydrocoele surgery.[2] A country claiming to have achieved elimination of LF as a public health problem must be able to show the readiness and quality of these available services and it is recommended that at least 10% of designated facilities providing each service (lymphoedema management and hydrocelectomy) are assessed nationwide.[4]

The World Health Organization (WHO) and partners recently developed and validated a tool to assess the readiness of health facilities to provide quality lymphoedema and adenolymphangitis services.[5–7] However, no tool existed that specifically assesses the readiness and quality of hydrocelectomy services. Other WHO tools, such as the Service Availability and Readiness Assessment (SARA)[8] and the Situational Analysis to Assess Emergency and Essential Surgical Care,[9] collect information on facilities providing hydrocelectomies, with the latter collecting data on the reasons why this procedure is not performed. However, for LF elimination programmes to effectively assess the readiness and quality of hydrocelectomy services specifically, a more focussed tool is required. The aim of this work was to develop, pilot and roll out a tool that could be used in LF programmes delivering or planning to deliver hydrocelectomy services that both assesses the readiness of the programme to deliver services at the minimum standard of care required by the WHO, as required within the LF elimination dossier, and identifies health system strengthening (HSS) and capacity building requirements for programmes and assists them in developing a quality improvement plan.

Methods

Development of the HSFAT

The hydrocoele surgery facility assessment tool (HSFAT) was developed by a team of researchers, public health specialists and programme managers at the Centre for Neglected Tropical Diseases at the Liverpool School of Tropical Medicine (LSTM) in 2018. The aim of the tool was to access the readiness of hydrocoele surgery services in health facilities prior to LSTM supporting hydrocoele surgical campaigns in LF-endemic countries, in collaboration with Ministries of Health (MoHs) with financial support from UK aid (Department for International Development [DFID], formerly the Foreign, Commonwealth and Development Office [FCDO]).

The first version of the tool was developed using indicators from the SARA[8] and WHO publication Surgical Approaches to the Urogenital Manifestations of Lymphatic Filariasis,[10] which outlines a protocol for hydrocoele surgery and includes a 'needs assessment' for the facilities, medicines, instruments and consumables required for hydrocoele surgery. The hydrocoele surgery needs assessment was combined with relevant indicators from the SARA tool to develop the HSFAT version 1.

From January to March 2019, the HSFAT (version 1) was piloted in Bangladesh, Malawi and Nepal in all facilities where hydrocoele surgical campaigns were planned by the relevant MoHs (Table 1) and financially supported by LSTM. In Bangladesh and Nepal, the survey was implemented by the national LF programme staff, with support from LSTM researchers. In Malawi, the survey was implemented by the national LF programme and a local researcher with experience in surgical procedures. After this initial piloting, edits to the HSFAT were made based on feedback from programmes and research teams. These changes related mostly to ease of use and did not alter indicators as defined by the source WHO documents. Some additional questions were added to the tool following the publication of updated WHO guidance on hydrocoele surgery.[11] Finally, a number of indicators that directly affect the quality of services offered were identified as 'key' indicators (Table 2). All other indicators were identified as 'supporting' indicators, which provided context and background information.

The HSFAT (version 2) was rolled out across country programmes implementing hydrocoele surgery in the Accelerating the Control of Neglected Tropical Diseases (Ascend) West and Central Africa Programme,[12] including Benin, Burkina Faso, Ghana, Guinea, Niger and Nigeria. The facilities were selected by the MoHs and in-country implementing partners where hydrocoele surgical campaigns were planned to be supported (see Table 1 for details). This study presents data from both the initial piloting of version 1 of the HSFAT and roll-out of version 2 of the HSFAT, as the minimal differences between the two versions are not sufficient to materially alter the process of using the HSFAT and were made in response to issues raised within the process.

Description of HSFAT

The HSFAT (version 2) consists of 142 indicators (there were 122 in version 1), of which 101 are 'key' indicators (Table 2). The HSFAT assesses facilities across 10 domains: 1) background information, 2) essential amenities, 3) emergency patient transfer, 4) laboratory capacity, 5) surgical procedures and trained staff, 6) infection prevention, 7) non-disposable basic equipment, 8) disposable basic equipment, 9) essential medicines and 10) current hydrocoele practices. Domain 1, the background information domain, is not assessed and gathers basic data on the location, size and human resources available within each facility. Domain 2, which covers water and electricity supply, is the only domain that has a pass/fail outcome, as this was a basic requirement stipulation by DFID. For all other domains, several 'key' indicators were identified as indicative of potential quality issues, with the remaining indicators providing additional supporting information for decision making. Domain 10, current hydrocoele practice, is asked only if facilities report that they are currently practicing surgery—therefore only selected facilities are assessed in this domain.

Protocol

The WHO recommends that patients with uncomplicated LF hydrocoeles should be treated at first-level hospitals, otherwise known as primary level, district, rural or community hospitals.[11] Complicated hydrocoeles should be treated at second-level hospitals, which includes regional/provincial hospitals, or third-level hospitals, which includes national/central hospitals or academic or university teaching hospitals.[11] The HSFAT can therefore be conducted at any first-, second- or third-level hospital. The WHO requires that 10% of facilities are assessed for quality.[4] If the

Table 1. Facilities undertaking the HSFAT in each country with facility type and managing authority

Characteristics		Bangladesh	Malawi	Nepal	Benin[a]	Burkina Faso	Ghana	Guinea	Niger	Nigeria	Total
Total facilities, n		15	24	5	8	30	8	5	15	8	118
Total districts/local government authorities/departments etc., n		3	24	4	8	30	7	5	12	8	101
Type of facility	Health centre	0	0	0	Unknown	0	0	0	0	0	0
	Subdistrict/ community hospital	12	1	0	Unknown	0	0	0	0	1	14
	District hospital	3	22	2	Unknown	26	6	2	10	4	75
	Provincial/ regional hospital	0	0	1	Unknown	4	1	3	0	1	10
	National referral hospital	0	0	2	Unknown	0	0	0	0	0	2
	Other (e.g. polyclinic) or unknown	0	1	0	Unknown	0	1	0	5	2	9
Managing authority	Government/ public	15	23	5	Unknown	28	7	5	14	8	105
	Non-governmental organization/not-for-profit	0	0	0	Unknown	0	0	0	0	0	0
	Private for profit	0	0	0	Unknown	0	0	0	0	0	0
	Mission/faith-based	0	1	0	Unknown	2	1	0	0	0	4
	Other or unknown	0	0	0	Unknown	0	0	0	1	0	1

[a]All facilities in Benin left domain 1 questions blank but answered the rest of the questionnaire.

primary purpose of the survey is to fulfil this requirement, this 10% of facilities should be randomly selected. However, in the presented data, every facility where hydrocoele surgeries were supported was assessed in order to ensure good quality services and as an aid to developing a quality improvement plan. The tool should be conducted onsite and health facility personnel should be identified to act as informants for the assessment. For domains 1–3, it is expected that a hospital administrator or staff member with managerial responsibilities should be able to answer. For domain 4, it is expected that a hospital administrator or laboratory staff member should be able to answer. For domains 5–9, it is expected that a surgical doctor or senior theatre nurse should be able to answer. For domain 10, a surgical doctor or theatre nurse who has knowledge of the implementation of hydrocoele surgery should be able to answer (Table 2).

Data were collected and reported using the Open Data Kit (ODK), made available on an electronic tablet and transferred to Excel (Microsoft, Redmond, WA, USA) for descriptive analysis by LSTM staff. An individual report was written for each country, discussing the answers facilities gave for each indicator and how many facilities gave specific answers. These reports were intended as an overview of how prepared the country was to perform hydrocoele surgeries, to highlight to stakeholders in the country where improvements were needed in individual facilities and to determine whether it was appropriate for a facility to conduct hydrocoele surgeries.

Table 2. Details of each domain in the HSFAT with the total number of indicators and key indicators

Domain	Information collected	HSFAT version 1		HSFAT version 2		Informant (staff member expected to respond)
		Indicators, n	Key indicators, n	Indicators, n	Key indicators, n	
1. Background information	Facility location, type, size and human resources	9	0	10	0	Hospital administrator or staff member with managerial responsibilities
2. Essential amenities	Water and electricity source	4	2	5	2	
3. Emergency patient transfer	Access to phones and vehicles for emergency transfer	2	2	5	2	
4. Laboratory capacity	Diagnostic testing for pre-operative screening	5	4	7	6[1]	Hospital administrator or laboratory staff member
5. Surgical procedures and trained staff	Implementation of hydrocele surgery	7	2	7	2	Surgical doctor or senior theatre nurse
6. Infection prevention	Infection prevention	5	5	5	5	
7. Basic equipment (non-disposable)	Equipment for hydrocele surgery	25	25	30	30[2]	
8. Basic equipment (disposable)	Equipment for hydrocele surgery	28	28	29	29[3]	
9. Essential medicines	Medicines for hydrocele surgery	14	14	14	14	
10. Current hydrocoele practice	Current hydrocele practice[a]	24	7	23	11[4]	Doctor/nurse with knowledge of hydrocoele surgery implementation

[a]All domain 10 questions answered by only facilities currently carrying out hydrocoele surgery (applies to both versions).
Domain 4: two additional lab tests added to the question in version 2: human immunodeficiency virus testing and general blood clotting (coagulation).
Domain 7: five pieces of equipment were added in version 2: electrocautery machine, knife handle, small steel cup, retractors (army/navy) and self-retaining retractor (hernia).
Domain 8: two pieces of equipment were added in version 2 (syringe catheter tip [60 ml] and surgical mesh [hernia]) and one was removed (needles, 24 G long). Intravenous saline solution was moved to domain 9.
Domain 10: four key indicators were added: protocols to distinguish between LF hydrocoeles and other causes of scrotal swelling, whether the surgeon conducts a confirmatory exam, whether preoperative ultrasound is used and measurement of blood glucose was added to the list of preoperative assessments.

The results of the tool should be reviewed in detail at the country level with relevant national and subnational stakeholders, including the MoH, and used to develop a quality improvement plan. This details recommendations from the assessment and assigned actions with agreed deadlines to improve the readiness and quality of hydrocoele surgery services provided by the relevant health facility.

Results

In total, 116 facilities across nine countries were assessed between 2019 and 2022. In all countries, most facilities surveyed were government/public hospitals, with a smaller proportion of mission/faith-based facilities (Table 1). Of the 15 facilities surveyed in Bangladesh, 3 were district-level facilities (first-level hospitals) and 12 were upazila (subdistrict)-level facilities (first-level hospitals). Of the five facilities surveyed in Nepal, two (50%) were district hospitals (first-level hospitals), two (50%) were national hospitals (third-level hospitals) and one was a provincial/regional hospital (second-level hospital). Of the five facilities surveyed in Guinea, two (40%) were district hospitals (first-level hospitals) and three (60%) were provincial/regional hospitals (second-level hospitals). All four (100%) of the surveyed facilities in Niger were national referral hospitals (third-level hospitals). For all other countries, most facilities surveyed were district-level facilities (first-level hospitals).

The results of the HSFAT key indicators (Table 3) demonstrate key areas for improvement in different countries. Performance in domains 2 and 3 was high, with at least 80% of facilities surveyed in each country reporting positively against each key indicator, except for Benin (62.5%), with an available, functional ambulance or other vehicle for emergency transportation.

In domain 4, the capacity to undertake all necessary laboratory tests onsite was variable, with countries achieving this in 40–100% of facilities. However, for some of the facilities that did not perform well in this indicator, an arrangement with a nearby facility was available.

In domain 5, the ability to observe patients after surgery was high, with only Nepal (40%) not having this capability in all facilities. However, the routine use of a surgical safety checklist was low in many countries; only Ghana reported this positively in 100% of facilities. In other countries, performance ranged from 6.7% in Bangladesh to 69.3% in Niger.

In domain 6, the availability of processes for the disposal of medical waste (both sharps and non-sharps) and for the sterilisation/recycling of surgical instruments was very high in all countries except for Guinea, where only 40% of facilities were able to dispose of waste appropriately and only 60% had appropriate processes for the sterilisation/recycling of surgical instruments.

Table 4 shows the average number and percentage of key indicators that were reported positively for each domain of the HSFAT in all countries. The availability of basic non-disposable equipment (domain 7) was low in Guinea, with an average of only 44.3% of equipment available at each facility. The availability of both disposable equipment (domain 8) and essential medicines (domain 9), however, was particularly low in Niger (average of 34.5% and 20%, respectively).

In domain 10, facilities performed most poorly on the availability of written protocols for staff to distinguish between complicated and uncomplicated cases of hydrocoele, with only 1 (14.3%) facility in Bangladesh, 7 (30.4%) facilities in Malawi and 2 (40%) facilities in Nepal having such protocols available. Other written protocols/guidelines were also limited in some countries, e.g. guidelines on standard precautions for infection prevention in Bangladesh (46.7%) and Niger (53%) and protocols to support staff to distinguish between LF hydrocoeles and other causes of scrotal swelling in Guinea (0%), Niger (7.7%) and Nigeria (37.5%). The number of facilities that provide all specified elements in their preoperative assessments was low in all countries except for Ghana (Table 3).

Discussion

The HSFAT was designed as an easy-to-use tool that could be managed in-country by national programmes. The electronic data capture method of the HSFAT uses ODK, a widely used freeware system that provides an easy-to-use interface in multiple languages and facilitates high-quality data entry using required fields, constraints on answers and direct upload to a cloud database.

Indicators varied in importance; for example, infrastructure such as piped water and a reliable electricity source (domain 2) are crucial. These were the only indicators with pass or fail criteria (due to funder requirements), as shortcomings in this area are not easily fixed and conducting surgeries in facilities without these may be unsafe. In Nigeria, one facility reported that they did not have piped water; this facility was therefore removed as a provider of surgeries.

Low performance in domain 4 for laboratory testing availability highlighted this as an area for concern in Nepal, Bangladesh and Benin. However, in Nepal, testing was available in nearby clinics, as demonstrated by the supporting indicator. This was also true of a small number of facilities in Bangladesh. The individual context of a facility should be considered; for example, the absence of in-house laboratory facilities in a rural clinic may be insurmountable, but in an urban clinic, nearby private facilities may be available and appropriate.

The absence of written protocols and guidelines as demonstrated in domains 5, 6 and 10 can be resolved with appropriate document provision and training and should therefore not be a long-term barrier to surgery provision. Following completion of the HSFAT in Malawi, a meeting took place in March 2019 attended by key staff at the MoH and clinical staff to review the results of the HSFAT and ensure that the assessments were fed into the relevant MoH departments for action. Following the meeting, consultant regional surgeons were deployed to eight hospitals to conduct training to address gaps identified during the HSFAT prior to implementation of a hydrocoele surgery campaign to deliver >2000 surgeries across these eight locations. Staff training included surgeons, anaesthetists, surgical nurses, theatre attendants, ward nurses and ward attendants. The consultant regional surgeons also developed a supportive supervision assessment tool to assess whether strict criteria were being followed during implementation of the surgeries, which was monitored during supportive supervision trips to the hospitals. In Niger, protocols

Table 3. Number and percentage of facilities that were marked positively on each key indicator (in domains 2–6 and 10) in the HSFAT

		Version 1 countries			Version 2 countries					
Domain	Assessed indicator	Bangladesh	Malawi	Nepal	Benin	Burkina Faso	Ghana	Guinea	Niger	Nigeria
Total facilities assessed, n		15	24	5	8	30	8	5	15	8
Domain 2	Facilities with water piped directly into the facility	15 (100)	24 (100)	5 (100	8 (100%)	29 (97)	8 (100)	4 (80)	14 (93)	7 (88)
	Facilities with an available electricity supply (central, generator or solar)	15 (100)	24 (100)	5 (100)	8 (100)	29 (97)	8 (100)	5 (100)	14 (93)	8 (100)
Domain 3	Facilities with a functioning telephone available to call outside at all times	15 (100)	24 (100)	5 (100)	8 (100)	30 (100)	8 (100)	5 (100)	15 (100)	6 (75)
	Facilities with an available, functional ambulance or other vehicle for emergency transportation	14 (93)	24 (100)	4 (80)	5 (63)	29 (97)	8 (100)	5 (100)	14 (93)	7 (88)
Domain 4	Facilities able to conduct all specified lab tests onsite[a]	6 (40)	23 (96)	3 (60)	4 (50)	21 (70)	8 (100)	5 (100)	13 (87)	7 (88)
	Facilities able to conduct one or more specified lab tests offsite[a]	2 (13)	0 (0)	2 (40)	0 (0)	4 (13)	8 (100)	0 (0)	0 (0)	0 (0)
Domain 5	Facilities that routinely use a surgical safety checklist[b]	1 (7)	9 (38)	2 (40)	3 (38)	19 (63)	8 (100)	2 (40)	9 (60)	3 (38)
	Facilities that have capacity to observe hydrocoele patients for the specified length of time following surgery[c]	15 (100)	24 (100)	2 (40)	8 (100)	30 (100)	8 (100)	5 (100)	15 (100)	8 (100)
Domain 6	Facilities that have clean, running water piped directly into the theatre	13 (87)	17 (71)	5 (100)	8 (100)	28 (93)	8 (100)	4 (80)	13 (87)	8 (100)
	Facilities that have guidelines on standard precautions for infection prevention[d]	7 (47)	23 (96)	4 (80)	0 (0)	29 (97)	8 (100)	3 (60)	8 (53)	6 (75)
	Facilities that have an appropriate, functional method for sterilising/recycling surgical instruments[d]	14 (93)	24 (100%)	5 (100%)	6 (75%)	29 (97%)	8 (100%)	3 (60%)	15 (100%)	8 (100%)

Table 3. Continued

Domain	Assessed indicator	Version 1 countries			Version 2 countries					
		Bangladesh	Malawi	Nepal	Benin	Burkina Faso	Ghana	Guinea	Niger	Nigeria
	Facilities that have an appropriate, functional method for disposing of sharps waste[d]	15 (100%)	24 (100)	5 (100)	8 (100)	30 (100)	8 (100)	2 (40)	15 (100)	8 (100)
	Facilities that have an appropriate, functional method for disposing of medical waste other than sharps waste[d]	14 (93)	24 (100)	5 (100)	8 (100)	30 (100)	8 (100)	2 (40)	15 (100)	8 (100)
Domain 10[e]	Facilities that have protocols to support staff to distinguish between LF hydrocoeles and other causes of scrotal swelling[b,f]	N/A	N/A	N/A	0 (0)	17 (57)	8 (100)	0 (0)	2 (13)	3 (38)
	Facilities where the operating surgeon conducts confirmatory examination before the patient is brought to the operating theatre and before surgery is undertaken[f]	N/A	N/A	N/A	0 (0)	28 (93)	8 (100)	4 (80)	14 (93)	8 (100)
	Facilities that use pre-operative ultrasound for differential diagnosis[f]	N/A	N/A	N/A	0 (0)	9 (30)	8 (100)	5 (100)	2 (13)	6 (75)
	Facilities with written protocols to support staff to distinguish between complicated and uncomplicated hydrocoele cases[b]	0 (0)	5 (22)	1 (20)	0 (0)	15 (50)	8 (100)	0 (0)	3 (20)	1 (13)
	Facilities that provide all specified elements in their preoperative assessment[g]	2 (29)	12 (52)	2 (40)	0 (0)	7 (23)	8 (100)	0 (0)	0 (0)	4 (50)

Values presented as n (%).
[a]In version 1 there were four specified lab tests: haemoglobin, blood glucose, urine dipstick–glucose and malaria rapid diagnostic testing. In version 2 there were six specified lab tests: the four from version 1 plus human immunodeficiency virus screening and general blood clotting.
[b]Only includes facilities that were able to show proof on the day of the assessment (applies to countries using both versions, if applicable).
[c]Specified length of time was 24–48 h in version 1 and 72 h in version 2.
[d]For version 1 countries, this includes all facilities regardless of whether they provided proof on the day of the assessment, as they were not asked for proof. For version 2 countries, this includes only facilities that provided proof on the day of the assessment.
[e]All questions in domain 10 are only for facilities currently performing hydrocoele surgery. Therefore the denominator is the number of facilities currently performing hydrocoele surgery (Bangladesh, 7; Malawi, 23; Nepal, 5; Benin, 0; Burkina Faso, 30; Democratic Republic of Congo, 18; Ghana, 8; Guinea, 5; Niger, 15; Nigeria, 8).
[f]Question in version 2 only.
[g]In version 1 there were six specified elements: evaluation of systemic illnesses, haemoglobin estimation, urinalysis, measurement of blood pressure, lignocaine sensitivity test and explanation of procedure and informed consent. In version 2 there were seven specified elements: the six from version 1 plus measurement of blood glucose.

Table 4. Mean number of key indicators marked positively for each facility and percentage of maximum available for each country for each domain in the HSFAT

Domain	Key indicators (version 1), n	Mean number per facility and overall percentage of key indicators marked positively in version 1 countries			Key indicators (version 2), n	Mean number per facility and overall percentage of key indicators marked positively in version 2 countries					
		Bangladesh	Malawi	Nepal		Benin	Burkina Faso	Ghana	Guinea	Niger	Nigeria
1. Background information	0	–	–	–	0	–	–	–	–	–	–
2. Basic amenities	2	2.0 (100)	2.0 (98)	2.0 (100)	2	2.0 (100)	2.0 (100)	2.0 (100)	1.1 (56)	1.9 (93)	1.9 (94)
3. Emergency patient transfer	2	1.9 (97)	2.0 (100)	1.8 (90)	2	1.6 (81)	2.0 (98)	2.0 (100)	1.3 (63)	1.9 (97)	1.9 (94)
4. Laboratory capacity	4	3.1 (78)	4.0 (99)	3.6 (90)	6	5.5 (92)	5.6 (93)	6.0 (100)	3.8 (63)	5.8 (97)	5.9 (98)
5. Surgical procedures and training	2	1.1 (53)	1.4 (69)	0.8 (40)	2	1.4 (69)	1.6 (82)	2.0 (100)	0.9 (44)	1.6 (80)	1.4 (69)
6. Infection prevention	5	4.2 (84)	4.7 (93)	4.6 (92)	5	3.6 (73)	4.9 (97)	5.0 (100)	1.8 (35)	4.4 (88)	4.8 (95)
7. Basic equipment (non-disposable)	25	20.5 (82)	23.5 (94)	24.2 (97)	30	26.5 (88)	27.4 (91)	30.0 (100)	13.3 (44)	20.7 (69)	27.3 (91)
8. Basic equipment (disposable)	28	19.9 (71)	23.6 (84)	25 (89)	29	21.5 (74)	24.1 (83)	29 .0 (100)	13.8 (47)	10.6 (37)	27.0 (93)
9. Essential medicines list	14	9.3 (66)	12.3 (88)	12 (86)	14	13.1 (94)	12.7 (91)	14.0 (100)	7.0 (50)	4.3 (31)	13.6 (97)
10. Current hydrocele practice[a]	7	5.3 (76)	5.6 (80)	5.6 (80)	11	–	7.9 (72)	11.0 (100)	4.8 (43)	6.9 (63)	9.0 (82)

[a]Calculated for facilities currently performing hydrocele surgery only (Bangladesh, 7; Malawi, 23; Nepal, 5; Benin, 0; Burkina Faso, 30; Ghana, 8; Guinea, 5; Niger, 15; Nigeria, 8).

to distinguish LF hydroceoles from other scrotal swellings were made available and associated training sessions for all surgeons were undertaken in all Ascend-supported districts. In Benin, following the results of the HSFAT, surgeon training was conducted, with the support of Master trainers, and all facilities were provided with standard operating procedures and surgical safety checklists.

Other indicators, such as those in domains 7–9 (basic non-disposable equipment, basic disposable equipment and essential medicines), do not necessarily reflect the readiness of a facility to safely carry out surgery and can be resolved in the short term by purchasing additional supplies. Longer-term sustainability may be assured through the assessment and improvement of stock management and supply chain processes. Care should be taken that the results are assessed and quality improvement plans developed by appropriately informed stakeholders who understand the local context. In Niger, the HSFAT process indicated a lack of some non-disposable equipment, most disposable equipment

and all of the essential medicines required. Ascend funds were used to build/rebuild stocks, allowing surgeries to continue to the end of 2021.

Several issues were identified within facilities in one particular health district in Guinea that were not resolvable within the timescale of the Ascend programme. Therefore the decision was made to not support surgeries in this health district. It is hoped, however, that the issues highlighted by the HSFAT may be resolved to ensure good quality hydrocoele surgery in the area in the future.

It should be noted that while the HSFAT is particularly concerned with hydrocoele surgery, several indicators relate more widely to other surgeries and healthcare provision. Therefore, undertaking improvements recommended by the HSFAT process may result in quality improvement, capacity building and HSS in a broader sense.

Conclusions

The HSFAT is an easily used electronic tool that is tied to WHO standards, protocols and requirements. Its use provides an opportunity for country programmes to evidence quality services and to build capacity and strengthen their health systems in the provision of hydrocoele surgery. The process has been well received by countries using it and has already resulted in a number of quality improvements that are set to continue through 2021. It is hoped that, beyond Ascend, the HSFAT tool may provide countries with a valuable tool towards the elimination of LF as a public health problem.

Supplementary data

Supplementary data are available at *International Health* online (http://inthealth.oxfordjournals.org).

Authors' contributions: LAKH and NR conceived and designed the study. SM, HM, CB, HH, XB, JK, ASM, JC, PR, PBC, RB, DA, BA, AC, SAB, JS, HB and LAKH collected and analysed the data. SM, HM, HH and HB drafted the manuscript. All authors read and approved the final manuscript. SM and HB are guarantors of the paper.

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