



Challenges and opportunities in plastic reconstructive surgery and burn care in Bangladesh

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ABSTRACT

Introduction: Bangladesh, a Muslim majority developing country, faces difficulties and burdens in patient care, especially for women. These include limitations of medical professional staff, lack of knowledge in state-of-the-art treatments, after-care in the field of plastic reconstructive surgery and burn care, especially in the countryside and remote areas. Various programs for (primary) health care improvements are underway, including sanitary programs to increase general health. Accessibility to medical facilities are being improved by concepts such as floating-boat hospitals for the local population, satellite clinics, usable with mobile phone apps, preventive and disease surveillance, and educational programs.

Findings: These concepts overcome multiple challenges and bear numerous opportunities for the needs in remote areas and can act as a role-model beyond developing countries.

Conclusion, Future Directions: Bangladesh has great potential when it comes to the implementation and further development of plastic reconstructive surgery, burn and wound care, and regenerative treatment.

1. Introduction

Bangladesh, located in Southeast Asia with 165 million inhabitants, is the eighth largest populated country worldwide. Poverty is widespread and access to sanitation is estimated at 54%, data from 2014 estimate that 55% of the urban population are slum dwellers [1]. This is associated with a major health problem [2]. Additionally, females and children are underrepresented in health care [3–5]. (Fig. 1)

At least twice annually, a group of volunteering female plastic and reconstructive surgeons (Reconstructing Women International, RWI) (<https://www.reconstructingwomen.org/>) visit Bangladesh (among others i.e., India, Pakistan, Kenya, Tanzania) for a surgical mission in urban primary health care centers. Camps were held since 2009 on board of three different boat clinics (Lifebuoy Friendship Hospital,

Emirates Friendship Hospital, and Rongdhonu Friendship Hospital) (2009–2020), all organized and owned by the Bengal Non-governmental organization (NGO) Friendship, and a land based permanent hospital in Shyamnagar (2020). The duration of each camp is approximately 7 days. There, the surgeons focus on treating women and children who suffer from burns, scarring and contractures, performing various plastic and reconstructive surgical procedures to alleviate disease. The intention of the fully charitable international organization RWI, founded in 2007, formerly Women for Women (WfW) Reconstructive Surgery, is to provide women access to plastic surgical treatment. The camps were held and organized in cooperation with local established partners as Friendship and the Acid Survivor Foundation in Dhaka (<https://acidsurvivors.org/>).

These medical mission camps provide the ability to bring specialists

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to patients who have otherwise limited access to these treatments [6], especially in the country-side, where 71.6% of the population face a general lack of medical professionals [3,7]. Thus, these focused treatment camps are associated with positive social impacts and long-term effects for patients [2,6]. Furthermore, this initiative does not just come with the potential to treat patients with targeted programs (i.e. burns/females), but can also teach the local medical professionals state-of-the-art procedures and explain implement treatment strategies and protocols for alternative and aftercare therapy.

This article aims to discuss the challenges, the need and opportunities, as well as the potential in the field of plastic, reconstructive surgery (PRS) and burn care in Bangladesh. A special focus on female care and the use of mobile applications in rural and remote areas will also be addressed.

2. Challenges in patient care in rural and remote areas

According to a WHO report in 2012, one of the largest burden in Bangladesh is unintentional injuries, for instance, road accidents [8] and burns [9]. More than 365,000 people are injured by electrical, thermal and other causes of burn injuries [10]. Furthermore, electrocution burns cause for up to 56,000 [11] deaths per year. Many females get burned while cooking or heating items over open flame or with kerosene lamps [12], since they lack electricity in their homes. In lieu of the availability of medical treatments and professional care, burn victims use household items to treat the injured wound areas, i.e. fresh eggs, albumin, salty water, toothpaste, kerosene, coconut oil, cow dung, or soil [10]. In addition, 68% of assaulted burn victims are females who are involved in marital quarrels and suffer from severe wounds caused by sulphuric acid and kerosene oil, which also lead to a higher mortality [13].

Many patients have problems seeking medical aid because they live in rural areas, hundreds of kilometers away from the closest center, which are difficult to get to [13]. Most of these (primary) medical facilities do not have the capacity to provide a comprehensive service for every specific disease [13,14]. Furthermore, once in a hospital, there is a lack of knowledge regarding acute and intensive burn care. Plastic, reconstructive surgery is underrepresented in Bangladesh, the existing clinics are overcrowded. There is also a lack of options regarding wound dressings and materials, and options for long-term aftercare are extremely limited. Low-income countries face a shortage of rehabilitation services, including physical and occupational therapy [6], including missing instructions for patients at home, which are essential for post-operative care following reconstructive hand surgery, for instance.

There is also a lack in regenerative medicine and surgery using for instance, (combined) treatments with cells/fat grafting [15] for functional or aesthetic scar release (in burns). Even though there are attempts in Bangladesh research implementing tissue engineering [16,17] for (skin) regeneration, mesenchymal progenitor treatments including perinatal tissue products [16], are not ready for patient yet.

General challenges, when carrying out any type of treatment, are the costs to the patient and their ability to pay [18] as subsidies from available insurance and government support programs are limited. Another factor for treatment, specifically for women, is the surrounding social-religious community, which has a large influence on treatment [7]. Socio-cultural background and financial constraints contribute to insufficient care post-burn and account for a high number of long-term permanent disability, especially among children (5.7 per 100,000) [5].

Because of the mentioned accessibility limitations with the main problem of transportation and extreme poverty which makes it very difficult for most residents to be close to care, aid camps aim to help. Missions are planned exclusively upon invitation by local NGOs (in Bangladesh) and or hospitals or doctors (e.g. India). One attempt is focusing on helping women, and in specific, women who have suffered and survived dowry burns, a phenomenon that sadly still is very common in Bangladesh (in India and other countries in the area). Because of the lack of plastic and reconstructive surgeons in Bangladesh and no available time to participate, RWI an organization with female doctors and teams who preferably treat women patients are well perceived. Women (burn) patients and their families of sociocultural reasons feel confident to be exclusively treated by females (due to the Muslim background), which represent the uniqueness of RWI and the mission camps in Bangladesh. The challenge in all the developing world, including Bangladesh, is the set-up of the collaboration between the non-profit, non-governmental-organizations (NGO) and the medical team leaders and the regional government. These challenges includes the initial meeting and how the communication and partnership is maintained. Financial resources must also be addressed, which depend solely on donations. For example, arranging the operating theatre and consumable materials are brought by the teams. For example, surgical instruments, sterile drapes and coats, all kinds of suture materials, tourniquets, pulse oximeters, electrocoagulation machines, respirators and are donated after every mission to the hospitals. Working together with the local teams in addition a supply list is given in advance what is needed. Last but not least, team members have to be vetted in their respective fields with the appropriate training with oversight monitors to ensure the safety of all patients. All these challenges have to be

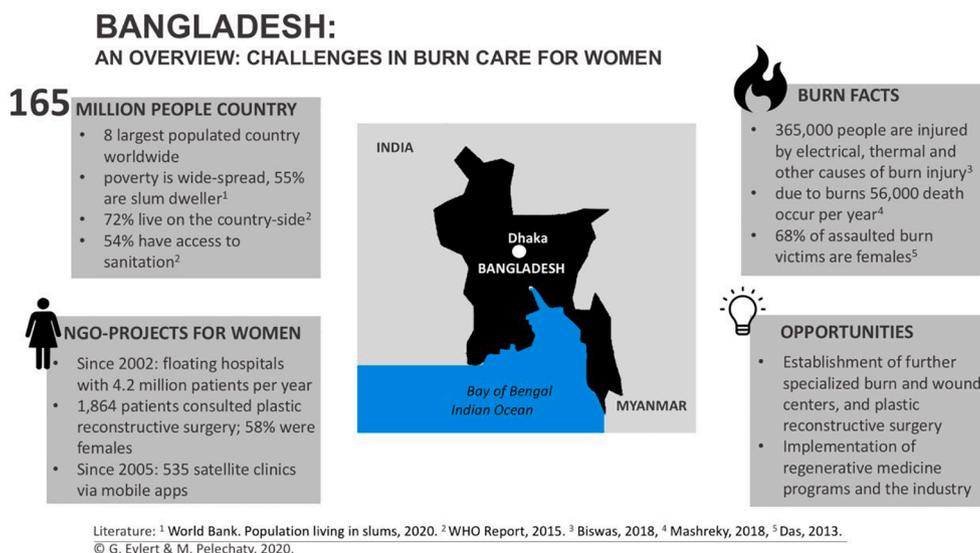


Fig. 1. Bangladesh, An overview of challenges in burn care for women.

overcome for a successful mission, which requires lots of time.

3. Need for NGOs and aid camps in rural and remote areas and their opportunity to help

With public health measures already in place, NGOs can provide important assistance. For instance, in developing countries, such as Bangladesh, it is of fundamental importance to undertake the first steps in enabling access to clean water in sanitary facilities [19] and promote medical programs to guarantee general health [20]. In Bangladesh these disease prevention programs run under the climate change program, which were adapted due to frequent natural disasters [21,22]. These projects, which contains plans such as “water plants” provide purify drinking water from arsenic contaminations; they help overcome water shortages and have improved patients’ health in recent years [9,23]. Furthermore, there are other programs for the immunization of children, cervical cancer for females, and medical health camps. In addition, there are preventative actions to help reduce burn injuries, including broad educational development programs in schools related to health care and solar-powered lightning technology in homes which reduces the demand for traditional wood burning stoves. NGOs are also reaching out to individual villages to bring education to them via the development of internet technology for consulting and teaching. These all contribute ultimately to better health care [23], which are launched by philanthropic NGOs [20,24].

As a step toward accessible health care, NGOs pioneered exceptional health achievements [24]. For instance, the Friendship NGO started a medical clinic known as the “floating hospitals” in 2002 that are mobile boats that can tour various locations along the river applying the concept of the “4As Model in Healthcare” as affordability, availability, awareness and acceptability [25]. The concept allows patients living near the riverbanks to consult medical teams on a boat that is equipped with nurses, doctors, and operation rooms for surgeries. This enabled 4.2 million patients to access the services, with 700,000 people being served [22,26] per year.

Meanwhile the collaboration and partnership with Friendship and RWI has been established over 13 years, which provides pro bono expertise in plastic reconstructive surgery. The surgical camps can only be organized in conjunction with local host hospitals and clinics. So far it was possible to conduct/perform 1–2 mission trips annually to various locations in urban areas in Bangladesh (by the boat hospitals at the riverbank areas of Gaibandha and Kurigram Districts and in the local hospital at the Satkhira District). To date 1864 patients, of which 58% were female, have consulted the plastic reconstructive surgery, and in 2019 alone 104 surgeries were performed (NGO statistical database), and with RWI approximately 100 patients are treated per mission.

Dates for camps are chosen and prospective patient are vetted by the local team of doctors and nurses. Challenging cases have photographs sent for review and planning to the RWI. Afterwards the decision is made for the number and composition of the teams based on expected surgical volume and nursing needed. The types of plastic procedures done run the gambit of the field of plastic surgery. However, due to time and facility restrictions, procedures which need only one stage are preferred. Prosthetic implant reconstruction, free flaps or cell/fat grafting are never performed. Patients which present and can not be offered an adequate treatment are referred to acute burn centers or specialized institutions for disease. An appropriate patient selection is made; patients safety is key. The group of the RWI is a well-functioning team working together since many years, including surgeons and anesthetics and training young fellows. During operative procedures training and teaching is performed which includes local doctors. The initial post-operative evaluations are done by the visiting team and longer term follow-ups, if needed, are done by the local host team. Complications are monitored (such as skin graft failure and occur per mission in approximately 1–2 patients), online contact is maintained throughout the mission, local doctors on the hospitals are instructed on further

management; in the land based hospital an MD lives on site with follow up clinics. Some patients with skin grafts and K-Wires require longer term follow-up and patients are chosen based on their ability to follow-up (e.g. commute to facility). A few sites have been visited through the years on multiple occasions (e.g. the floating boat), and a few patients have had serial surgeries performed. Procedures for (female) burn treatment include, for instance, Z-plasty, scar and contracture release, or microneedling on various body locations (head, neck, trunk, genitals, hand and legs), which represent a tremendous improvement for patients. Regarding rehabilitation (e.g. splint), staff of the boat clinics and sometimes physiotherapist, on site after group departure, follow-up and performed dressing change.

4. Potential in a developing country

The Friendship NGO has further helped with medical needs by accessibility programs providing basic health care, known as “satellite clinics”. These were introduced in 2005 in some remote areas and bear great potential in preventive and medical management in disease control. The NGO has developed and operated in over 535 satellite clinics (mobile clinics) throughout Bangladesh. These efforts are important in developing regions where patients are deprived of proper aid.

Most families living in communities have access to the wireless internet through their mobile phone. Hence, they have access to mobile apps. These apps [27] can be used to find the closest health care facility and can connect with healthcare workers in nearby communities at a grassroots level for basic injuries. These apps could be further modified in the medical field for educational purposes and scaled up nationally. First, they could provide infographics and easy-to-follow instructional help when it comes to immediately needed medical help and wound injuries. For example, they could offer a graphic centered around “what to do if a burn injury occurs”. Second, these apps, could provide information on aftercare, including instructions on wound care, dressing, and physiotherapy with (video) exercises. On top of this, and beside this beneficial key function of tele-health-medicine patients could make appointments, consult medical aid professionals, and be further informed about times and locations about surgical or specialized mission camps, such as female doctors for female patients. Internet access also has the power to push preventative health care (for burns), promote awareness programs (ex. assault), and increases patients’ knowledge of possible plastic and reconstructive surgeries, including regenerative procedures or recruit for special-demand studies and programs.

With the expanded use of the internet and cell phone technology, there is an ideal situation to set up mentor systems between the hospitals and the visiting team. Thus, teaching and patient care will be extended beyond the travel dates.

These conceptual access strategies bear tremendous potential to strengthen their primary health care system and can be translated to many other regions and countries worldwide. Effective evidence-based online tools in burn care have been evaluated previously for instance in remote areas in Australia [28]. They have found good response levels and could be further utilized when providing tele-medicine for burn treatment. This example of digitalization can act as a role-model beyond emerging countries [29].

Additionally, alliances between the government and the industry could help alleviate the financial burden and build more medical facilities and sustainable satellite health technologies as mentioned above. They could also help fund research studies for regenerative innovative approaches. In a country with 165 million people, Bangladesh has great potential and need for implementation and introduction for all kinds of plastic reconstructive surgery innovations. From reconstructive to regenerative and aesthetic, which do not require lots of bulky machinery (ex. liposuction, cell centrifugation, syringe/cell preparation-devices) can all be conducted easily in urban areas (ex. loop-glasses, hospitals).

Social Media and technological innovation could also be used to stream information on “needs for improvement” and “challenges” – for

burn care and any other medical discipline. The above-mentioned concepts and ideas can be translated to other (developing) countries.

5. Conclusion and future directions

When it comes to burn care, there is the need to establish further wound and specialized centers to provide the infrastructure for the high number of (female burn) patients in this developing country. There is great potential to implement regenerative approaches, even in remote and rural areas with a professional and safe set-up for patients.

Mobile phones apps and satellite clinics, which are used to help people in remote communities, can be used and translated for future challenges in medicine.

Further research, funding, efforts, as well as support for the training of health care workers, are imperative. Modernizing the quality in patient care and disease surveillance are key for a long-term improvement for patients and should always be the ultimate goal. This includes supporting women in their right to accessible health care.

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Ethics approval and consent to participate

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