

## Challenges of Managing Burns outside the Burns Unit

Mr. Anirban Mandal<sup>1\*</sup>

<sup>1</sup>MS, MSC, FRCSEd, FRCSPPLAST, Consultant Burns and Plastic Surgeon Locum, St. Helens and Knowsley Hospitals NHS Trust, Merseyside, UK

DOI: [10.36347/sasjs.2022.v08i05.014](https://doi.org/10.36347/sasjs.2022.v08i05.014)

| Received: 03.04.2022 | Accepted: 08.05.2022 | Published: 23.05.2022

\*Corresponding author: Mr. Anirban Mandal

MS, MSC, FRCSEd, FRCSPPLAST, Consultant Burns and Plastic Surgeon Locum, St. Helens and Knowsley Hospitals NHS Trust, Merseyside, UK

### Abstract

### Review Article

Recent advancements in the field of burn care have resulted in improvement of overall holistic care of which 'out-of-burns unit' management is a significant cornerstone commencing in the pre-hospital interventions with a continuity in different stages of burn rehabilitation. Challenges are multifactorial and related to resources, competence, leadership, teamwork and management. Efficient burn rehabilitation with multidisciplinary care can be achieved with the treatments outside the burns unit in the critical journey of transition from the stage of 'burn victim' to 'burn survivor'. Burn care providers should implement quality-guaranteed and cost-effective protocols and programs to combat such challenges globally, especially in the low and middle income countries to achieve the best outcome.

**Keywords:** 'out-of-burns unit' burn rehabilitation, 'burn survivor', treatment.

Copyright © 2022 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

## INTRODUCTION

In adherence with the international burn care standards burn management is now designed to be conducted in the designated burn centres, units or facilities in high, medium and low-income countries. Due to several constraints globally, there is still a role of burn management outside the burns unit.

However these out-of-hospital treatment modalities have significant challenges which can be attributed to pre-hospital care in acute burns, Infection management and dressing protocols in the community setting, Burn rehabilitation, Telemedicine, Burn outreach program, Burn specific clubs and camps.

Challenges are predominantly related to resources limited environment (RLE) [1], inappropriate knowledge, skills, ability, leadership and teamwork. As per international society of burn injuries (ISBI) vision, it is important to focus on these challenges and look for solutions to achieve efficient burn management outside the burns unit.

### Pre-hospital care in acute burns

Ahmed *et al.*, [2] evaluated the appropriateness of airway management in the different modes of transport (air ambulance versus ground ambulance) of patients with burn injury +/- inhalation injury.

Statistically significant independently linked factors with using air ambulance include total body surface area (burns TBSA), lower GCS, associated trauma and inhalation injury. However they have concluded that the air medical providers, although resuscitating sick patients were 5.78 times more likely to jeopardise the airway as compared to the ground ambulance providers. Airway management is the biggest challenge especially in major burns with inhalation injury. This may be attributed to the training issues of air medical providers. Better education for advanced airways and more aggressive treatment protocols are the potential solutions. In middle and low income countries, managing airway out-of-hospital by air or ground ambulance is still a big challenge because of lack of resources, knowledge and skills.

### Out-of-hospital chest escharotomy

Kupas *et al.*, [3] described care of two patients that required out-of-hospital chest escharotomy by physicians of a helicopter medical team. No documentation of other escharotomies outside the hospital has been found in the literature. Circumferential chest burns restricting respiratory effort and inhibiting adequate ventilation are real challenges in the initial lifesaving management. The authors reviewed the chest and neck escharotomies and described

the logistics of performing escharotomy in the prehospital setting.

### Acute community management of paediatric burns

Cox *et al.*, [4] conducted a prospective audit of 353 children with thermal injuries during 2012/2013. No cooling was instituted in 130/353 patients and 65% of the patient's wounds were cooled for 10 minutes or less. Cooling the burn wound with cool/tepid water for 20 minutes is recommended [5]; however a high percentage cooled it for 10 minutes or less. Forty four children with burns greater than 10% TBSA did not receive fluid resuscitation. During the pre-hospital period six factors were inadequately addressed – first aid, cooling of wound, early covering of wound and prevention of hypothermia, fluid resuscitation, analgesia and transfer. These factors are potential challenges of out-of-hospital burns management especially in the rural geographical areas.

### Home Oxygen Burns

Vercruyse *et al.*, [6] conducted a study on home oxygen burns and although these can be treated in the community on a cost saving basis (average cost saving \$12,500). Average TBSA was 4% and mostly partial thickness. 28-61% arrived intubated and 80% were extubated within 8 hours of admission and all within 24 hours. The challenge of treating these burns in the community is meticulous assessment of the airway and the need for intubation with subsequent transfer to the burns unit.

### Pre-hospital burn dressing

Initial Covering of the burn should be preferably done with polyvinyl chloride film (cling-film) or a sterile cotton sheet. However, in the pre-hospital setting the burns are frequently covered with cowdung, toothpaste, gums, ointments etc which is a real challenge outside the burns unit. An intensive first aid and pre-hospital teaching and training is necessary globally to address this common problem.

### Pre-hospital care in chemical burns

Animal studies have shown that irrigation of both acid exposures and alkaline exposures within several minutes decreases the pH change in the skin and the extent of dermal injury. A burn centre case series found that patients who received irrigation within 10 minutes had a 5-fold decrease in full-thickness injury and a 2-fold decrease in length of hospital [7].

Diphoteryne solution has been recently emerged as universal emergency washing solution for chemical burns as reported by Andrews *et al.*, However the solution is not widely available even in the ambulance crew to apply it in the initial hour of the chemical burns injury. Extensive knowledge and implementation are required to make this a standard practice in the pre-hospital stage [8].

### Infection management in community-based burns care and dressing challenges in the rehabilitation unit

Although life-threatening infections are rare in most patients with burns treated in the primary care setting, challenges of wound care in the community are the understanding of the factors that may increase the risk of infection, clinical signs and symptoms of infection and when to seek specialist advice [9].

Standard operating protocol for dressings in different scenarios is quintessential to deliver consistent care to the burn patients.

Adherence to simple skill sets, such as, meticulous handwashing technique, sharp debridements, use of shower or bath for mechanical cleansing.

Quantification of bacterial burden with susceptibility or resistance to antimicrobials is important in the event of suspicion of an infection. Deep tissue involvement with the signs of sepsis should be evident to start systemic antibiotics [10]. Communication with the microbiologist is essential to commence the antibiotics and the patients may need to be transferred to the burns unit.

Rehabilitation units should be provided with private rooms with shower to minimise cross-contamination which is one of the important challenges outside the burns unit [11].

Collaboration of nurses and therapists is another challenge to design adaptive equipments and spintages [13].

Graft loss because of shearing, moving across bedsheets, changing clothings or pressure garments along with the exercise regimes designed by the therapists is a big challenge. Water-based lotions to the grafted non-elastic skin avoid dryness of the neo-epidermis and the ones without petroleum base avoid the formation of inclusion cysts or clog pores. [12].

'Melting' phenomenon with an apparent disintegration with surface infection is a challenge in the rehabilitation facility outside burns unit which may be associated with increasing pain or uncontrolled drainage. Regular 'soap and water' handwashing by patients, clinicians, therapists and caregivers can prevent this surface infection. A standardised operating protocol with the choice of topical bacteriostatic or bactericidal antimicrobial agents should be in the logistics of 'out of burns unit' burns management.

Dressing choice in the rehabilitation unit varied from fine mesh gauze dressings to petroleum gauze dressings to soft silicone foam dressings [10, 13-15].

Standard dressings in the acute burns unit consist of fine mesh petroleum gauze often impregnated with an antimicrobial agent [16]. Outside the burns unit, the challenges remain to avoid infection and ensure further healing of patchy wounds. Wet-to-dry dressings are not supported in recent research because of the pain element and can over debride the healthy tissue [17, 18]. Showering and Bathing are of utmost importance allowing the mechanical cleansing and change of dressing when they are thoroughly wet adding an analgesic element during change of dressings [19].

Dressing needs to be adjusted with the therapy sessions and pain prevention should be the priority. Areas over open joints, neurovascular bundles, and exposed tendons should be dressed with utmost care and may involve soft silicone foam dressings as viable options of burn wound care outside the burns unit [14].

Both patients and caregivers should be empowered to address and manage their wounds with a training protocol as wounds begin to heal and time needed for wound care decreases, such as, meticulous handwashing, surgical glove applications, pain medications half an hour prior to the dressing change, dressing change during shower or bathing, education of clinical evidence of infection, using soap and lukewarm water, using topical ointments and creams and wound coverage with clean and dry dressing [20].

Enteral nutrition is the cornerstone of post burns muscle rebuilding and wound healing with an enriched formula of high protein and high carbohydrate diets supplemented with vitamin C,E and micronutrients with a caution to avoid hepatic steatosis [21, 22].

Although this is routinely done with the input of a dietician in the burns multidisciplinary team, the nutrition management is a challenge outside the burns unit. Effective communication between the caregiver in the community and the dietician in the burns centre is essential in the out of hospital burns management.

### Outpatient burns management

Staffing needs and planning services are the greatest challenges in collating the outpatient management of burns. Although in the UK most of the outpatient burns treatment is integrated in the burns unit, globally this is massive challenge from the point of resources, manpower and execution.

Phelan-Rohrer *et al.*, [23] studied the comparison of concerns of burn patients treating in the outpatient setting outside the burns unit. Pain and physical function were found to be the concerning factors. Further studies are warranted to determine whether these factors are addressed and what

interventions are needed to improve the treatment of these concerns.

### Burn rehabilitation

Burns are a massive global health disaster resulting in devastation to the burn survivors with significant functional limitations that prevent productive and purposeful living (World health organisation).

“One world, one burn rehabilitation standard” is the vision of ISBI – However this is a significant challenge in identified geographical locations due to lack of financial, educational and material resources to conduct burn rehabilitation successfully. Serghlou *et al.*, [1] reported that while in some cases the problem is knowledge and skills to practise burn rehabilitation, in the majority cases lack of resources to do so because of financial constraints.

Pena *et al.*, [24] described community based exercise program (COMBEX) equivalent to 12-week in-hospital program of resistive and aerobic exercises for children with >30% TBSA. Statistically significant increase in Lean Mass and aerobic capacity was found in the COMBEX group. However the challenges in the COMBEX group are the compliance and availability of gym facilities in the community which everyone can afford.

Hudeshagen *et al.*, [25] reported the benefits of patient-centred exercise programs in achieving measurable positive rehabilitation outcomes. However the challenges remain for compliance and organisation and maintaining reproducible and reliable programs.

WHO’s international classification of functioning, disability and health (ICF) has been successfully applied to a wide range of health diseases and conditions. Application of ICF in burn injuries has not been quantified. Rehabilitation in the settings outside burns unit need to keep accurate records using ICF to draw overarching conclusions [26].

Hypertrophic burn scars developing during rehabilitative and remodelling phase causing pain and pruritus are major challenges for therapists. Although recent therapy studies suggest no major statistically significant differences in the compression and non-compression group, pressure garments still remain as the gold standard in controlling global oedema, improving circulation and prevention of contracture and scarring. The compliance with pressure garments is another challenge as they are needed longterm (12-18 months post injury) and continuous applications except during dressing change and daily hygiene [27-29].

Balance between splintage and mobilisation is extremely challenging and a meticulous

communication between patients, caregivers and therapists help in achieving the best results [30].

Pain during rehabilitation is challenging as this is related to wound care and also hours of occupational and physical therapies associated with speech and swallowing assessment by the relevant teams. Rehabilitation psychologist can teach some hypnotic and relaxation techniques and combat the pain and anxiety prior to exercises or dressing changes [31].

Pain during the rehabilitation phase can be procedural, background or breakthrough. Procedural pain is the most intense and associated with strong anxiety and therefore strong opioids along with anxiolytic agents, such as, benzodiazepines are the cornerstone of this condition. The background pain responds well to long acting opioids providing continuous therapeutic blood levels [32].

Breakthrough pain is associated with exercise after transient inactivity which can be managed with short –acting opioids and non-steroidal anti-inflammatory drugs [32].

### **Burn Camps, Support groups, outreach and social support**

Maslow *et al.*, [33] examined the literature on summer paediatric burn camps with description of burn camp structure, activities, staffing and effect of burn care programs on campers and camp staff volunteers. Burn camps can decrease isolation, improve self-esteem and promote coping and social skills. Over 25 years, paediatric summer camps provide strong community benefits. The challenge of organising the burn camps is the safety or the effect of burn camp on clinical or rehabilitation outcomes, financial constraints and compliance.

Burn support groups are an appropriate and essential adjunct to ‘out-of-burns-unit’ management journey. Burn survivors actively participating in these support groups can boost patients’ self-esteem, self-confidence and positive thinking [27]. The group sessions not only help the patients but also the families coping with recovery and tolerating setbacks.

Geographical constraints with low population density can be a challenging factor in providing psychosocial support to burn survivors and their families. Johnson *et al.*, [34] initiated ‘Burn Survivors Together Program’ to provide support to large number of burn survivors through annual multi-site regional meetings. The study involved 73 participants in 2014 and 89 participants in 2015. The evaluation was done in a Likert format with 1=strongly disagree and 5=strongly agree. And based on qualitative analysis of simple questions, such as, ‘the event was enjoyable’; ‘what did you find most enjoyable about this event’ etc. The study concluded that holding burn survivor support events at

accessible sites promotes the community value and provide education regarding resources.

Faoro *et al.*, [35] looked at the geographical influences on social integration after burn injury measuring functional outcomes at 12 months post burn with the metrics – community integration questionnaire (CIQ), SF-12 physical and mental scores (PCS and MCS), satisfaction with appearance ( SWAP) and satisfaction with life ( SWL). Multivariate linear regression analysis confirmed geographic region as a significant predictor of functional outcomes.

Vigorous support networks for burn survivors of all ages are still a need. Gill *et al.*, [36] conducted a systematic review of support opportunities for adult and paediatric burn survivors and identified gaps despite evolution of out after care programs. Social media may prove helpful in developing new programs to meet the needs of burn survivors and families. Challenges still remain in program development and maintenance based on meeting the recovery requirements.

Grieve et al conducted a study on the role of peer support groups in psychosocial recovery with life impact burn recovery evaluation (LIBRE) study [37]. Statistically significant differences were found in the support group participants and non-participants after adjustments for gender, TBSA and time since injury. Big challenges of depression, anxiety and feelings of isolation can be solved with peer support groups as clinical modality of burn management outside the burns unit and with development of programs where they are not available.

Abrams *et al.*, [38] highlighted the importance of social support and network with the discharge plans augmenting the services required for patient’s home communities. One size fits all doesn’t apply in discharge from hospital to home or community. The management of burns still continue out-of-hospital in the community reinforcing health with basic human touch of companionship, sensitivity of human emotions and value of the individuals. The challenge here is meticulous understanding of the supportive assets and deficits in this transition stage of burn victim to burn survivor and can be solved with a detailed planning and execution from the multidisciplinary team.

Burns outreach programs with clinical nurse specialists in burns are recent developments in post hospital burn care which certainly support the patients being treated in their home environment. The challenges are the service of suitably trained and experienced nurse, geographical distance to be covered by the nurse specialist, compliance with the treatments and communication with the burn centre.

### **Telemedicine**

Wallace *et al.*, [39] conducted a comprehensive systematic review of the use of

telemedicine in the burns management with all studies between 1993-2010. Although telemedicine can assist with acute triage, management guidance or outpatient care, the challenges in the field of telemedicine are technical and clinical feasibility and cost-effectiveness.

In the 24 studies included in the review, none of the studies are randomised and there were only 5 studies that were case-controlled.

Significant research is essential to prove the efficacy of telemedicine as an armamentarium of burns management outside the burns unit.

Hickey *et al.*, [40] reviewed their experience of incorporating interactive home telehealth (IHT) visits into follow up burn care.

The data included patient and injury demographics, total number of encounters and service for each encounter, length of visit including travel distance and time saved and complications including readmissions and connectivity issues. Although IHT is a safe and feasible modality for delivering follow-up care to burn patients and patients benefit from improved access to the burns multidisciplinary team and cost reductions from travel expenses, validated studies are still required to ensure patient and provider satisfaction in terms of cost-effectiveness and safety.

'Burnpics' – a store-and-forward protocol has been implemented in 2006 and reported in the study conducted by Brownson *et al.*, [41]. For established patients to email photographs to verify healing and range of motion and videoconferencing follow-up for select patients. The program mitigated the challenges of follow-up burn care creating minimal additional time burden on providers. The challenges of using the videoconferencing facility may be a challenge for certain group of patients, e.g, elderly population.

Liu *et al.*, [42] reviewed the applicability of teleburns in the rehabilitative phase through urban telemedicine. Videoconferencing streamlined patient care outside the burns unit reducing health care costs and maintaining quality of care and patient satisfaction. The program maximised time spent in therapy avoiding unnecessary patient travel to offsite appointments.

Virtual visits saved 6.8 outpatient burn clinic days or 73clinic appointments of 30-minute duration. However such an efficient link between burns centre and rehabilitation facility is very challenging in the low and medium income countries.

## CONCLUSION

In the acute setting of burns centre, unit or facility, 'saving life' is the first priority. However part of the lifesaving armamentarium sometimes start outside the burns unit with a challenging airway or need for

fluid resuscitation which needs a fully competent pre-hospital team to solve the initial problem. Post-Burns unit management challenges are conglomeration with the 'pre-injury patient' status ensuring minimised 'back to work' time, efficient rehabilitation, psychosocial and psychiatric support, nutrition maintenance and intermingling with the society. This article has explored the potential areas of challenge of managing burns outside the burns unit with some potential solutions that can be followed in the burn care providers for better outcome in the critical step of patient's transition from burns victim to burns survivor.

## REFERENCES

1. Serghiou, M. A., Niszcak, J., Parry, I., Li-Tsang, C. W. P., Van den Kerckhove, E., Smailes, S., & Edgar, D. (2016). One world one burn rehabilitation standard. *Burns*, 42(5), 1047-1058.
2. Ahmed, A., Van Heukelom, P., Latenser, B., Liao, J., & Born, J. (2011). 197 Out-of-Hospital Airway Management in Burn Patients With or without Inhalation Injuries. *Annals of Emergency Medicine*, 58(4), S243.
3. Kupas, D. F., & Miller, D. D. (2010). Out-of-hospital chest escharotomy: a case series and procedure review. *Prehospital Emergency Care*, 14(3), 349-354.
4. Cox, S. G., Martinez, R., Glick, A., Numanoglu, A., & Rode, H. (2015). A review of community management of paediatric burns. *Burns*, 41(8), 1805-1810.
5. Yuan, J., Wu, C., Holland, A. J., Harvey, J. G., Martin, H. C., La Hei, E. R., ... & Godfrey, C. (2007). Assessment of cooling on an acute scald burn injury in a porcine model. *Journal of burn care & research*, 28(3), 514-520.
6. Vercruyse, G. A., & Ingram, W. L. (2012). A rationale for significant cost savings in patients suffering home oxygen burns: despite many comorbid conditions, only modest care is necessary. *Journal of Burn Care & Research*, 33(6), e268-e274.
7. Leonard, L. G., Scheulen, J. J., & Munster, A. M. (1982). Chemical burns: effect of prompt first aid. *The Journal of trauma*, 22(5), 420-423.
8. Andrews, K., Mowlavi, A., & Milner, S. M. (2003). The treatment of alkaline burns of the skin by neutralization. *Plastic and reconstructive surgery*, 111(6), 1918-1921.
9. White, R., Swales, B., & Butcher, M. (2012). Principles of infection management in community-based burns care. *Nursing Standard (through 2013)*, 27(2), 64-68.
10. Rode, H., Vale, I., & Millar, A. (2008). Continuing medical education. *Burn Wound Infection*, 26(9), 440-443.
11. Helvig, E. I. (2002). Managing thermal injuries within WOCN practice. *Journal of WOCN*, 29(2), 76-82.

12. Merz, J., Schrand, C., Mertens, D., Foote, C., Porter, K., & Regnold, L. (2003). Wound care of the pediatric burn patient. *AACN clinical issues*, 14(4), 429-441.
13. Jacobs, K. (1992). Statement: occupational therapy services. *J Burn Care Rehabil*, 4, 378-387.
14. Davies, P. (2008). Evidence review: the clinical benefits of Safetac® technology in wound care. *Journal of wound care*, 3-31.
15. Meuleneire, F. (2007). Evaluation of a soft silicone foam dressing in the management of 2nd degree burns in paediatric patients. *Wounds UK*, 5(2), 1-5.
16. Carrougher, G. J. (1998). *Burn Care and Therapy*. St Lewis, MO, Mosby.
17. Coyne, N. (2003). Eliminating wet-dry treatments. *Remington Rep*, suppl, 8-10.
18. Ovington, L. G. (2001). Hanging wet-to-dry dressings out to dry. *Home Healthcare Now*, 19(8), 477-483.
19. Heimbach, D., Engrav, L., & Gibran, N. (2003). *Burn Pearls Seattle WA: University of Washington Burns Centre at Harbourview Medical Centre*.
20. Hall, B. (2012). Care for the patient with burns in the trauma rehabilitation setting. *Critical care nursing quarterly*, 35(3), 272-280.
21. Mazzotta, M. Y. (1994). Nutrition and wound healing. *Journal of the American Podiatric Medical Association*, 84(9), 456-462.
22. Prins, A. (2009). Nutritional management of the burn patient. *South African Journal of Clinical Nutrition*, 22(1), 9-15.
23. Phelan-Rohrer, E., Greenhalgh, D., Palmieri, T., & Sen, S. (2015). Comparison of concerns of burn patients treated in an outpatient setting. *Journal of Burn care and Research*, 36.
24. Pena, R., Herndon, D., Elliott, T., Meyer, W., & Suman, O. (2014). Effects of community based exercise in children with severe burns. *Journal of Burn Care and Research*, 35.
25. Hundeshagen, G., Suman, O. E., & Branski, L. K. (2017). Rehabilitation in the acute versus outpatient setting. *Clinics in plastic surgery*, 44(4), 729-735.
26. Osborne, C. L., Meyer III, W. J., Ottenbacher, K. J., & Arcari, C. M. (2017). Burn patients' return to daily activities and participation as defined by the International Classification of Functioning, Disability and Health: a systematic review. *Burns*, 43(4), 700-714.
27. Peña, R., Ramirez, L. L., Crandall, C. G., Wolf, S. E., Herndon, D. N., & Suman, O. E. (2016). Effects of community-based exercise in children with severe burns: a randomized trial. *Burns*, 42(1), 41-47.
28. Perin, G., Ching, R. C., & Anwar, M. U. (2016). Outpatient workload in the NHS: A new challenge for the burn services?. *Burns*, 42(8), 1699-1703.
29. Wiechman, S. A., Carrougher, G. J., Esselman, P. C., Klein, M. B., Martinez, E. M., Engrav, L. H., & Gibran, N. S. (2015). An expanded delivery model for outpatient burn rehabilitation. *Journal of Burn Care & Research*, 36(1), 14-22.
30. Reicard, R. (2001). PT/OT Forum. *J Burn Care Rehabil*, 22, 365.
31. Patterson, D. R., Everett, J. J., Bombardier, C. H., Questad, K. A., Lee, V. K., & Marvin, J. A. (1993). Psychological effects of severe burn injuries. *Psychological bulletin*, 113(2), 362-378.
32. Summer, G. J., Puntillo, K. A., Miaskowski, C., Green, P. G., & Levine, J. D. (2007). Burn injury pain: the continuing challenge. *The journal of pain*, 8(7), 533-548.
33. Maslow, G. R., & Lobato, D. (2010). Summer camps for children with burn injuries: a literature review. *Journal of Burn Care & Research*, 31(5), 740-749.
34. Johnson, N., Loen, S., & Pauley, A. (2016). Burn survivor support in a state with low density population. *Journal of Burn Care and Research*, 37.
35. Faoro, N., Chang, P., & McMullen, K. (2016). Geographic influences on social reintegration after burn injury: A burn model system national database study. *Journal of Burn Care and Research*, 37.
36. Gill, B., Powers, L., & Noga, C. (2016). Systematic review of support opportunities offered through a burn centre for adult and paediatric burn survivors. *Journal of Burn Care and Research*, 37.
37. Grieve, B., Shapiro, G., & Wibbenmeyer, L. (2016). Assessment of the role of peer support groups in psychosocial recovery from burn injury: A Life impact burn recovery evaluation study (LIBRE). *Journal of Burn care and Research*, 37.
38. Abrams, T., Ogletree, R., & Ratnapradipa, D. (2015). A qualitative analysis of community based support for burn injured persons. *Journal of Burn Care and Research*, 36.
39. Wallace, D. L., Hussain, A., Khan, N., & Wilson, Y. T. (2012). A systematic review of the evidence for telemedicine in burn care: with a UK perspective. *Burns*, 38(4), 465-480.
40. Hickey, S., Gomez, J., Meller, B., Schneider, J. C., Cheney, M., Nejad, S., ... & Goverman, J. (2017). Interactive home telehealth and burns: A pilot study. *Burns*, 43(6), 1318-1321.
41. Brownson, E., Cannon, C., & Thompson, C. (2016). Combining store –and-forward pictures and videoconferencing for outpatient burn follow-up care. *Journal of Burn Care and Research*, 37.
42. Liu, Y. M., Mathews, K., Vardanian, A., Bozkurt, T., Schneider, J. C., Hefner, J., ... & Goverman, J. (2017). Urban telemedicine: the applicability of teleburns in the rehabilitative phase. *Journal of Burn Care & Research*, 38(1), e235-e239.