

## A review of primary and secondary burn services in the Western Cape, South Africa

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**Background.** In 2011, the Department of Health of the Western Cape Province, South Africa, requested a review of current burn services in the province, with a view to formulating a more efficient and cost-effective service. This article considers the findings of the review and presents strategies to improve delivery of appropriate burn care at primary and secondary levels.

**Methods.** Surveys were conducted at eight rural and urban hospitals, two outreach workshops on burn care, four regional hospitals and at least 60 clinics in Cape Town and in the Western Cape as far as Ladismith. A survey on community management of paediatric burns was also included in the study.

**Results.** The incidence of burns was highest in the winter months, more than half of those affected were children, and the majority of burns were scalds from hot liquids. Most burn injuries managed at primary level were minor, with 75% of patients treated by nurse practitioners and discharged. The four regional secondary hospitals managed the majority of moderate to severe burns. There is room for improvement in terms of treatment facilities and consumables at all levels, regional hospitals being particularly restricted in terms of outdated equipment, a shortage of intensive care unit beds, and difficulties in transferring patients with major burns to a burns unit when indicated.

**Conclusion.** The community management of paediatric burns was satisfactory, although considerable delays in transfer and insufficient pain control hampered appropriate care. A great need for ongoing education at all levels was identified. Ten strategies are presented that could, if implemented, lead to tangible improvements in the management of burn patients at primary and secondary levels in the Western Cape.

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Burn care in South Africa (SA) has traditionally (and erroneously) been viewed as purely an emergency service rather than a complex multidisciplinary three-tiered service requiring appropriate expertise, including rehabilitation, at primary, secondary and tertiary levels. If one of these levels fails, undue strain is placed on the next level and the whole system disintegrates, resulting in increased patient morbidity and mortality. Those involved in strategic planning for provincial burn care need to realise that appropriate triage can only follow the establishment of a suitable infrastructure at each level.

Burn care in SA is variable in terms of organisation, clinical management, mortality, facilities and staffing.<sup>[1-4]</sup> In 2011, the Western Cape Government Department of Health (WCG DoH) requested a review of current burn services in the province (Circular H73 of 2011, unpublished) with a view to formulating a more efficient and cost-effective service.

This article reports the findings of an initiative to obtain information to guide this process. We present data on urban and rural burn care at primary and secondary levels and make recommendations for improving service delivery. Data collected included patient demographics, mechanism and severity of injuries sustained, level of care received, referral pathways or patterns, and aspects of service delivery at primary and secondary levels.

### Methods

Data were gathered from numerous sources and collected under the direction of the corresponding author (HR). All the surveys listed below were conducted by senior clinicians involved in burn care and/or research. All resources are available on request from HR.

1. Minutes of the Reorganisation of Burn Services Western Cape Task Group meetings (2009). The task team was asked to rationalise burn services in the teaching group of hospitals in the Western Cape.
2. Review of Highly Specialised Services in the Public Hospital Sector, Directorate: Health Financing & Economics (June 2001).
3. Reorganisation of Burn Services Western Cape (2009) by HR. An extensive review with recommendations towards a seamless burn care strategy.
4. Report to the WCG DoH (November 2013). A study to assess the burden of 2 172 burn injuries from rural and urban areas presenting to public hospital emergency centres during the period June 2012 - May 2013.
5. Hallén H. The socio-demographic distribution of burn injuries of different severity levels in resource poor settings: A hospital-based study in the Western Cape Province, South Africa. (Subset of a student project from the Karolinska Institute, Sweden, 2012.)
6. Surveys undertaken at four regional hospitals during 2012 - 2013.
7. Surveys from 13 hospitals and nine rural clinics at a burns management workshop held in Ladismith during 2012.

**Table 1. The proposed structure of burn services (2009)**

		Facility		
		Level 1: PHC + district hospitals, e.g. G F Jooste, Karl Bremer hospitals	Level 2: regional hospital, e.g. New Somerset, Victoria, George, Worcester hospitals	Level 3: provincial tertiary hospital, i.e. Tygerberg, Red Cross War Memorial, Groote Schuur hospitals
	Day hospital clinics			
Service to be provided	Basic management of minor burns	Selected cases Complete service Referral protocols	Complete service Selected cases Referral protocols	Complete service Major and specific burns
Personnel required	Medical officers & nurse practitioners	Medical officers & nurse practitioners	Surgeons, medical officers, nurses Level 2 staff	Dedicated trained staff: plastic surgeon, paediatric surgeon
Resources required	Clinic facility with appropriate burn medication, dressings	Clinic facility with appropriate burn medication	Specific burn care facilities including theatre, ICU and diagnostic services	Specific burn care facilities including theatre, ICU and diagnostic services
Links, supporting services/specialties on site	Referral and transport protocols	Referral and transport protocols Step-down facility	General or plastic surgeon, full or part time Step-down facility	Emergency rehabilitation services, team services with occupational therapy, physiotherapy, dieticians, social work Step-down facility
Description of case-mix and referral proposed by level	Only minor burns for treatment, larger/special burns to be referred	Only minor burns	Minor and moderate burns	SABS admission criteria with modification
Teaching function	Basic burn care Possible EMSB course	Basic burn care Possible EMSB course	Basic burn education to medical and supporting personnel, EMSB course	Pre- and postgraduate Special nurse training, EMSB course

PHC = primary healthcare; SABS = South African Burn Society; EMSB = Emergency Management of Severe Burns (Australian/New Zealand Burn Association; internationally registered *acute burn course*).

8. Surveys from 11 rural clinics at a burns workshop held in Worcester during 2012.
9. Surveys from nine City of Cape Town clinics and 16 urban clinics and community health centres (CHCs) during 2012/13.
10. Information from the surgical data bank, Department of Surgery, Worcester Hospital, 2013.
11. Clinical guidelines for the management of burn wounds: WCG DoH Circular H73 of 2011.
12. Report on the evaluation of burn services in the Western Cape (2012) by HR.

**Ethical clearance**

Ethical clearance was obtained from the University of Cape Town (HREC Ref. 329/2015) and the WCG DoH.

**Results**

The 2009 Task Group reviewed the current status of burn care and formulated a broad-based organisational structure for a provincial burn care platform (Table 1).

The report to the WCG DoH from Stellenbosch University and the Karolinska Institute study reflected the extent of the challenges facing burn care in the Western

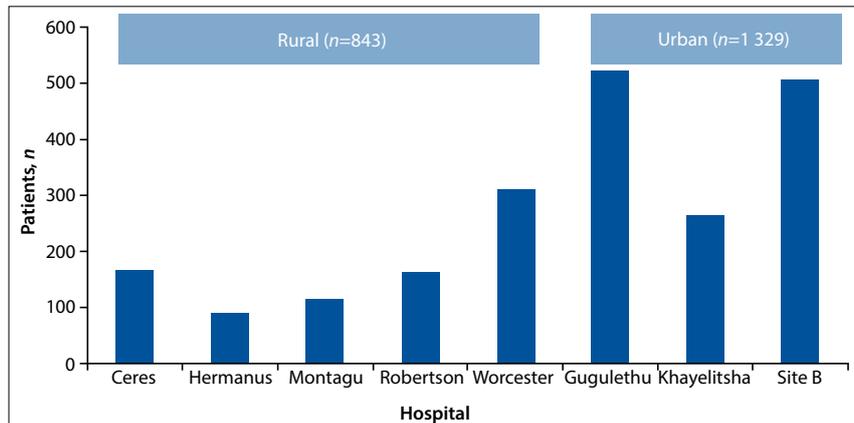


Fig. 1. Distribution of patients by participating hospital (N=2 172, June 2012 - May 2013).

Cape (Fig. 1). The increase in the incidence of burn injury during the winter months among both children and adults is depicted in Fig. 2. Fifty-two percent of patients were children and 53% males. Comorbidities existed in 11%, hot liquids were responsible for 65% of injuries and fire for 12%, 42% of burns involved less than 20% total body surface area (TBSA), and 70% were partial-thickness burns. The emergency medical service transported only 20% of the patients. Seventy-four percent of patients

were treated and discharged home, 7% were admitted to the facility, and 13% were transferred to another facility. Two-thirds of all patients presenting with injuries spent less than 5 hours at the facility. A mortality rate of 0.1% of all patients presenting with burn injuries was recorded. The Abbreviated Injury Scale was used to determine the severity of burns in this cohort of patients: 81.5% of patients had a score of 1, 16% a score of 2, 3% a score of 3, and 0.2% a score of ≥4.

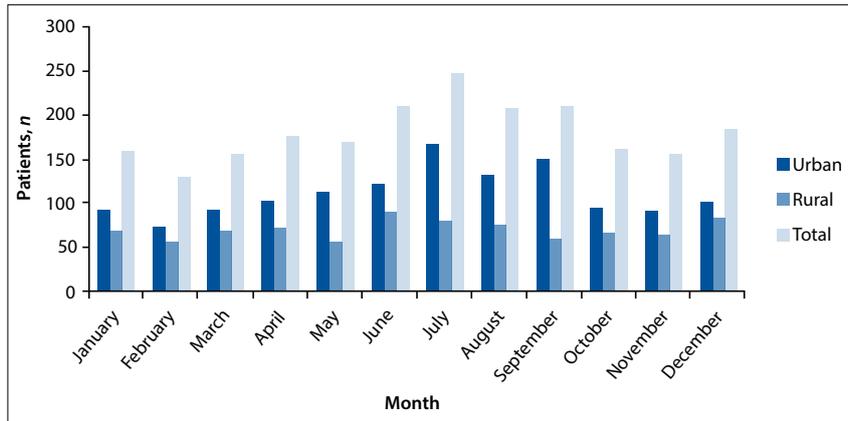


Fig. 2. Distribution of patients by month (N=2 172, June 2012 - May 2013).

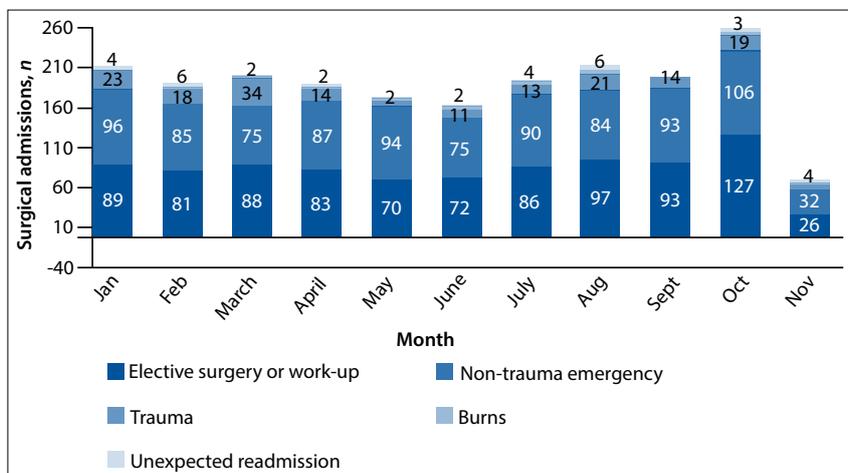


Fig. 3. Surgical admissions to Worcester Hospital, 2012.

The South African Burn Association's criteria for admission to a burns unit were only met in 7% of children under 1 year of age, in 4% of patients with deep burns, in 10% of patients with comorbidities and in 48% of patients with burns in special areas (face, hands and genitalia).<sup>[5]</sup> This information was essential to establish a baseline for evaluation of service delivery, as requested by the WCG DoH.

The facilities for burn care at regional hospitals, namely Paarl, Worcester, New Somerset and George hospitals, were reviewed. All the qualified specialists employed had support from registrars and medical officers. The consultant surgical staff had had some formal, albeit limited, exposure to burn surgery during their surgical training. The surgical infrastructure was sufficient to manage most of the patients presenting to the facilities. Operating time was limited, however, and burn patients were often accommodated only during emergency operating time. The operating theatres were generally well equipped to perform all surgery within the scope of the secondary hospital (with some advanced equipment perhaps more in keep-

ing with a tertiary hospital setting), except for burn surgery. Basic surgical equipment at secondary level was old and often dysfunctional, and there was limited access to modern technology and burn wound dressings. None of these regional hospitals had a dedicated burns unit or beds, or any capacity to isolate burn patients; both adults and children were accommodated in surgical wards. The nursing staff in several settings (the wards, clinics and operating theatres) had varying experience in organising a major burn theatre case or motivating for and implementing specific wound care strategies for their patients.

Fig. 3 depicts the burn workload of a typical regional hospital based on information drawn from the extensive surgical data bank for 2012 of the Department of Surgery, Worcester Hospital. This hospital managed most of the burns referred to it, because the receiving tertiary hospital for adult burns, Tygerberg Hospital (TBH), seldom had the capacity to accept referrals. Two of 30 patients meeting the criteria for referral were accepted by TBH in 2012. Referral to a higher level from the other three hospitals followed a similar pattern, with 7 of

542 over 9 years (2003 - 2011) from George Hospital, 8 of 23 patients from New Somerset Hospital over 4 months in 2012, and 10 of 50 adults and 6 of 33 children from Paarl Hospital during 2012. The Western Cape Government 'Clinical guidelines for the management of burn wounds' (circular H73 of 2011, unpublished and available on request from the corresponding author) was available in these hospitals and the senior staff acknowledged its contribution to the care of burn patients.

A major problem encountered was the shortage of intensive care unit (ICU) beds at secondary level. At the time of the survey, Worcester Hospital had only four surgical ICU beds to serve all surgical disciplines (for adults and children), George Hospital had six ICU beds for the entire hospital's needs, whether surgical or medical, Paarl Hospital had eight potential high-care beds and only two ICU beds (one for a surgical patient), and New Somerset Hospital had three ICU beds, of which one was typically allocated to all of surgery.

The results from workshops assessing burn care at rural sites yielded the following results. Burns were usually initially treated by nurse practitioners and only occasionally assessed and managed by medical practitioners (Table 2). Burns outside nurse practitioners' scope of practice were referred to more advanced service sites. Basic topical therapies available to nurse practitioners included silver sulphadiazine, acraflavin and Jelonet. Only three of 87 nurse practitioners had any prior education in wound or burn care.

The primary healthcare facilities visited yielded further important information relevant to the reorganisation programme. Some clinics saw as many as four burns a week, while others rarely managed burn injuries. The patients were assessed and treated by nurse practitioners with wound care consisting of cleansing, the application of cold compresses, analgesia, and referral to a higher level when deemed necessary. If the wounds were relatively small and non-compromising, patients were seen at the clinic on a daily basis for ongoing treatment until healed. A typical dressing room for such wound care was very basic and probably inappropriate for this function. Dressing rooms were small and overcrowded, with little privacy offered. These facilities were also simultaneously used for minor procedures such as abscess drainage, as well as for acute and chronic wound care.

Provincial clinics and CHCs managed patients directly referred from nurses from feeder clinics. Burns were assessed by a medical practitioner who had the capacity to institute emergency care and then refer patients to level 2 or 3 centres. Alternatively, they could elect to manage the patient on an ambulatory basis

**Table 2. Survey during workshop in Ladismith (2012) with 12 participating hospitals**

	Regional hospital	PHC
Region	Oudtshoorn, Heidelberg, Knysna, Uniondale, Vredenburg, Riversdale, Robertson, Alan Blyth Hospital, Stellenbosch, Mossel Bay, Hopefield, Beaufort West	9 regional clinics between Stellenbosch and Ladismith
Information from	Doctor/nurses	Clinic staff
Admissions of burn patients, <i>n</i>	2 - 40/month	3 - 4/month
Gender	Males = females	Males = females
Main causes of burns	Hot water, fire, chemicals, electricity	Hot water, fire, chemicals, electricity
Emergency care	H <sub>2</sub> O, Burnshield	H <sub>2</sub> O/nothing
Clinical management	Doctor/nurses (all)	Nurses (all)
Time from injury to treatment	Min. 2 days Often delayed	Often delayed
Topical therapy	Flamazine, Betadine, acriflavin, Burnshield, Jelonet	Jelonet, acriflavin
Pain control	Occasional	Occasional
Initial management	Only major burns referred	Dealt with many of the small burns
Referral	No evidence that the provincial protocol was implemented on a general basis. Referral was more based on <i>ad hoc</i> decisions	Similar
Education	No formal education in the principles and management of burn care among the majority of participants	No formal education in the principles of burn care

PHC = primary healthcare.

themselves. Dressing facilities were similarly ill equipped to offer patients modern standards of wound care. These services seldom managed more than two to ten such patients per month, with some seasonal variation. Basic treatment available on a daily basis consisted of Burnshield (for use up to 24 hours after injury), silver sulphadiazine and Jelonet; more expensive options, including Aquacel, Inadine, Bactigras, Acticoat and Actisorb, were sometimes (and inconsistently) available, and the rationale for their use was not always clear to the staff. The Western Cape Government 'Clinical guidelines for the management of burn wounds' was not available at any of the sites visited, although the 'Emergency medicine guidelines for the Western Cape' (2013, unpublished and available on request from the corresponding author) was available at a few sites.

Three hundred and fifty-three patient presentations to Red Cross War Memorial Children's Hospital, Cape Town, during 2012 were included to evaluate community treatment of paediatric burns. The following fac-

tors were assessed: demographics, emergency home management, wound cover, analgesia and transport to medical facilities. Patient ages ranged from 1 month to 14 years. The average TBSA was 15% (range 1 - 86%). Two hundred and nineteen patients initially presented to a CHC, with only 22 attending the hospital directly. The average time to present at the referring clinic was 4.56 hours (range 30 minutes - 24 hours). Emergency care consisted of the application of Burnshield as primary wound cover in all, and 295 children (83.6%) had received pain medication at clinic level.

## Discussion

Total burn care, from prevention to rehabilitation of the burn patient, is a long and difficult process, and burns frequently leave their victims scarred and disfigured. Every effort should therefore be made to maximise outcomes at each stage of management. Based on the findings of these various surveys, ten factors were identified that could, if implemented, lead to significant improvements

**Table 3. Ten-point plan to improve burn services in the Western Cape**

1. Prevention
2. Facility upgrade at primary level
  - a. Wound care stations
  - b. Restructure
  - c. New facilities
3. Facility upgrade at secondary level
  - a. ICU beds
  - b. Surgical equipment
  - c. Wound care stations
  - d. New facilities
  - e. Rehabilitation
4. Rational availability of consumables
5. Education of medical staff
  - a. ESMB course
  - b. Wound care
  - c. Tertiary hospital rotation
  - d. Accessible resources and guidelines
6. Education of nursing staff
  - a. ESMB course
  - b. Wound care
7. Improve resources and personnel of adult tertiary burn service, especially TBH
8. Burns registry
  - a. Lines of communication upgrade
  - b. Knowledge of resource utilisation
9. Telemedicine system
10. Burn disaster plan

ESMB = Emergency Management of Severe Burns (Australian/New Zealand Burn Association; internationally registered acute burn course).

in the management of burns at primary and secondary levels in the Western Cape (Table 3). Such improvements would require the WCG DoH to accept and implement the proposals within the context of other health service reforms and budgetary restraints.

Many of the previously published documents included in this study corroborated the findings of the surveys. In keeping with population distributions, the vast majority of patients treated for burn injury during the study period resided in urban areas (including both formal and informal settlements) and were treated at primary and secondary levels. An unknown factor, however, was the individual outcome of these patients. Of concern was the finding that only a few of the patients who met the South African Burn Society's criteria<sup>[5]</sup> for admission to a burns unit for treatment in terms of extent and severity of body surface area involved, were transferred to a higher

level. This emphasises the need to ensure adequate facilities, at local level, to treat the great majority of burn injuries. This is a major consideration with a direct impact on the efficiency of healthcare delivery in general and burn care specifically.

Although all secondary hospitals accepted responsibility for the majority of adult patients with burns and provided appropriate levels of care with few referrals, the shortage of high-care or ICU beds was one of the major reasons for referral to tertiary level being requested. Had ICU beds been available in the secondary hospitals, more patients could have been dealt with at that level without referral. Staff also rotated regularly, operating time was restricted, equipment was outdated, and there was limited access to modern dressings and technology. Referral of patients with major burns to the burns unit at TBH remained the greatest single problem in the system. While there are newly upgraded facilities at TBH, the extremely limited theatre time available remains the 'Achilles heel' of the service and prevents TBH from fulfilling its mandate as the Western Cape's dedicated adult burns centre. Turnover needs to be increased threefold, thereby opening spaces for referrals. To reduce demands on the TBH service further, surgical facilities for minor to moderate-size burns will need to be developed at the new Khayelitsha and Mitchell's Plain hospitals.

Adult burn patients seldom presented at the City of Cape Town CHCs (meant only for children aged <13 years with burn injuries), and were infrequently seen at provincial sites. If they were seen at the latter, it was usually only for emergency management followed by appropriate referral to level 2 facilities. Children with burns were initially treated at the nearest CHC, where the facilities and nursing expertise were often suboptimal and frequently resulted in poor diagnoses and initial management. Unnecessary referrals to a tertiary centre were commonplace. The 'Emergency medicine guidelines for the Western Cape' were only available at the various provincial hospitals, rather than at both primary and secondary levels. In our opinion, these guidelines and the 'Clinical guidelines for the management of burn wounds' are too extensive and should be more goal-directed towards the level of care at which they are intended to be used. A review of guidelines for use at primary level for the management of minor burns, and the emergency initial care of major burns, should be undertaken. Clear guidelines also need to be established for the management of burn patients at secondary level.

We suggest that four strategically placed CHCs be identified as primarily dedicated to burn care for children. Potential sites identified were the Delft, Elsie's River, Khayelitsha and Mitchell's Plain CHCs. These facilities would then act as referral sites to secondary level or as step-down facilities, where adequate burn treatment and possible rehabilitation could be delivered for minor to moderate-sized burns. There would be initial cost implications, but once the facilities were established, patients with burn wounds would benefit greatly.

Regarding consumables and equipment, two aspects need to be highlighted. Basic consumables should include only a few topical antiseptics. Burnshield to cool the acute burn wound, elastic tubular mesh retention bandages and appropriate dose-related analgesia for both children and adults. Acquisition of such consumables and equipment should be streamlined.

The second area requiring revision is the currently rudimentary wound dressing facilities at these various hospitals and clinics, which are small and congested with patients. The universal dressing rooms lacked basic equipment for proper wound care, had bath tubs instead of shower facilities, and lacked work surfaces for dressing changes. Dressing stations need to be upgraded with appropriate space and facilities for proper wound care, including a hand-held shower, a wash basin, a working surface, prepacked dressing packs and storage space.

An additional reason to upgrade all of these facilities, especially the surgical facilities, is that the entire network would be filled to capacity in

the event of a burn disaster. The surge capacity would be exceeded, with catastrophic consequences due not only to the shortage of beds, ICU facilities, nursing staff and medical personnel, but the lack of adequate resources to care for a single major burn over a long period of time.<sup>[6]</sup>

Personnel interviewed at all levels expressed the need for ongoing education in wound care programmes, theatre education and basic skills development, so that healthcare workers could become familiar with the latest advances and trends in burn care research and practice.<sup>[7-9]</sup> They also suggested that educational programmes should preferably be in-house, take place during normal working hours, and not last more than 45 - 60 minutes. Such programmes should be very practical, discuss current concepts, and require no special leave or travel arrangements on the part of staff.

Telemedicine or teleconferencing systems would facilitate effective burn care at appropriate levels, as burns are often either over- or under-triaged, with severe consequences for the patient. Initial on-site evaluation can be performed accurately via telemedicine, at low cost. Such a system would improve initial assessment, treatment, and decisions regarding need for transfer and resource utilisation, and would be especially valuable to outlying and smaller clinics.<sup>[10,11]</sup>

Development of a burns registry to monitor the incidence and causes of burns, the nature of the injuries and geographical areas affected should be considered, to evaluate areas of weakness within the system.

## Conclusion

Reorganisation of burn services is a worldwide phenomenon, despite varying circumstances and infrastructures, but ultimately all have the goal of improving care for the victims of circumstance. Reorganisation must be practical, attainable and affordable within the fiscal framework of, in this case, the Western Cape Provincial Administration. The suggested guidelines are not intended to be rigid or proscriptive, but to emphasise changes that would improve burn care. Ten crucial areas have been identified in which our proposals, if implemented, would ultimately prove cost-effective and substantially improve the standard of burn care. They are intended to guide practice and not to replace clinical judgement.

The service envisaged must also be equitable and accessible, irrespective of location, directed principally towards acute care without neglecting the entire process of recovery and rehabilitation. An intensive range of preventive programmes should include the provision of safe energy, adequate housing and education, and emergency services would have to be developed to complete the comprehensive burns management programme.

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