

REPORT 2013

Setting Standards for Burn Care Services in Low and Middle Income Countries



www.interburns.org



An Interburns Publication September 2012/
Updated September 2013

Setting Standards for Burn Care Services in Low and Middle Income Countries

Editor: Tom Potokar

Editorial Committee: Amr Moghazy, Michael Peck, Richard Bendell, RuthAnn Fanstone

1. Burn Care in LMICs
2. Operational Standards
3. Education & Training

Copyright © Interburns 2013

All rights are reserved. This report and any attachments to it may be confidential and are intended solely for the use of the organization to whom it is addressed. No part of this report may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photo-copying, recording or otherwise without the permission of Interburns. The information contained in this report is believed to be accurate at the time of production. Whilst every care has been taken to ensure that the information is accurate, Interburns can accept no responsibility, legal or otherwise, for any errors or omissions or for changes to details given to the text or sponsored material. The views expressed in this report are not necessarily those of Interburns.

Table of Contents

Foreword	4
Preface	5
Contributors	7
Acknowledgments	8
Executive Summary	9
Part 1 - Background	
1.1 Introduction	11
1.2 Operational Standards for Burns Services	12
1.3 Standards for Education and Training in Burn Care	13
Part 2 – Setting Standards for Burn Care Services	
2.1 Consensus Meeting Objectives	14
2.2 Consensus Meeting Outputs	14
2.3 Issues Specific to Burn Care in LMICs	15
2.4 Operational Standards	17
2.5 Levels of Service	19
2.6 WHO Trauma Resource Matrix	19
2.7 Burn Care Resource Matrix	19
2.8 Principles of Education and Training to Support Burn Care Standards	23
2.9 Conclusion	25
2.10 Next Steps	26
Appendix: Methodology and Summary of Activities	27
References	30

Setting Standards for Burn Care Services in Low and Middle Income Countries

Foreword

Burns are a global public health problem, accounting for close to 200,000 deaths annually. The majority of these occur in low- and middle-income countries, where a number of constraints complicate the public health task of addressing burns. While the primary prevention of burns in low- and middle-income countries is a pressing need, the World Health Organization (WHO) also actively encourages further development of burn-care systems, including the training of health-care providers in the appropriate triage and management of people with burns.

The process which led to this publication brought together a range of burn care clinicians with extensive experience in providing burn care in low- and middle-income countries. By discussing the needs of burn patients, and the inherent challenges of these settings in the context of WHO guidance for trauma care systems, the authors have been able to agree upon realistic standards for care of burns. Such an effort is an important stepping stone towards improving the health systems to which the vast majority of the world's burn patients present for care, as well as an important contribution to the overall public health challenge of preventing burns worldwide.

Dr David Meddings

**Department of Violence and Injury Prevention and Disability
World Health Organization**

Preface

In the *Plan for Burn Prevention and Care* the World Health Organization (WHO) highlights the need for improvements in burn prevention and burn care, better information and surveillance systems, and increased investment in research and training, especially in low and middle income countries (LMICs). This report, *Setting Standards for Burn Care Services in LMICs*, is the result of a comprehensive multi-national effort to address the specific needs of the burn care community in LMICs. The report identifies the main barriers to the implementation of effective burn care in LMICs and proposes a set of operational standards relevant to specific levels of burns service.

In high income countries (HICs), burn injuries have substantially decreased over the last fifty years as a result of changes in legislation, advances in education, better social conditions and dramatic improvements in the results of treatment. Unfortunately the same improvements have not been seen in LMICs, and of the 11 million people a year who suffer burns requiring medical attention, 95% live in LMICs and 70% are children ¹.

Burns have been described by the World Health Organization (WHO) as the 'forgotten global public health crisis'. Burn injuries have never received the level of attention and funding that is associated with HIV or infectious diseases, yet globally in 2004, the incidence of burns severe enough to require medical attention was nearly 11 million people and ranked fourth in all injuries, higher than the combined incidence of tuberculosis and HIV

infections ². Despite being a major cause of death and disability in LMICs, especially in South-East Asia, burns remains a chronically underfunded and often unrecognised issue at the national and international level. While burn injuries are a major cause of mortality and morbidity in children and young women globally, they do not neatly fit under any single Millennium Development Goal.

The WHO *Plan for Burn Prevention and Care*, proposed a strategic plan to address the global burns crisis. The principal objectives of this plan were to build understanding on the nature and preventability of burns, achieve the strongest possible impact by fostering and building partnerships to address burns, and fostering and building capacity to undertake effective interventions and evaluate their effectiveness.

The group of thirty diverse, experienced and motivated burn professionals who participated in the consensus meeting to agree standards in Kathmandu have taken up the challenge by developing a clear and evidence informed framework that states what can and should be achievable at different levels of burns service within LMICs. Local, national and international partners working collaboratively with ministries of health and other government departments now need to move forward with measures to achieve these standards, and as proposed at the end of this report, a comprehensive study assessing the outcomes and impact of such an approach needs to be undertaken.

¹ Mock C, Peck M, Peden M, Krug E (eds). *A WHO plan for burn prevention and care*. Geneva, World Health Organization, 2008. p2.

² Peck M. *Epidemiology of burns throughout the world. Part I: Distribution and risk factors*. Burns, Volume 37, 2011. p1087-1100.

Setting Standards for Burn Care Services in Low and Middle Income Countries

The authors of this report and all participants from the consensus meeting sincerely believe that the setting of operational standards represent a crucial first step in developing a coordinated international strategy to improve burn care in LMICs. We hope that the report will also provide a stimulus and sense of direction to all those involved in burn care in LMICs, which will ultimately result in significant reductions in burn injuries and improved outcomes for burn patients.

2013: Update on Operational Standards: Transforming Burn Care in Bangladesh and Nepal

In 2012, Interburns developed the first operational standards for burn services in Low and Middle Income Countries. It was always our intention that the standards outlined in this report would not simply be a 'piece of paper', but the starting point for the development of a practical assessment and quality improvement tool with the power to transform the standard of burn care worldwide.

Interburns is pleased to announce that it has been awarded a grant by the UK Department for International Development (DfID) to implement the operational standards in Bangladesh and Nepal over the next 3 years (2013-2016). This project will involve working closely with colleagues in Bangladesh and Nepal, assessing and supporting 10 burn units in the two countries, developing tailored training programmes to support Basic, Intermediate and Advanced level services, and delivering this training to 600 burn care professionals, while training a further 150 as instructors to disseminate training throughout both countries. This programme will also develop a range of innovative monitoring and evaluation tools, to measure the effectiveness of the standards in improving services and ensure that the training and support we provide translates into improved outcomes for burn patients, including the first

Patient Reported Outcome Measures (PROMs) designed specifically for burn patients in LMICs.

With DfID's support, Interburns is evolving the standards into a quality improvement tool that will enable burn services in LMICs to identify gaps in the care and prevention they offer, including the lack of key operational capabilities, staff training or knowledge, or vital equipment and facilities. Through a range of support, including tailored training programmes developed specifically to support the standards and a range of patient and clinician-focused outcome measures, Interburns and its local partners will help to close these gaps and drive sustainable improvements in the capacity and effectiveness of services.

Burns remain a massive and under-resourced global health problem that impact millions of people each year. The standards embody the core philosophy of Interburns: that all burn patients globally can be provided with good quality care, despite limited resources. The development of the standards into a practical quality improvement tool is another major milestone in the struggle to change the global face of burns and make that philosophy a reality. Through this project, we will be able to achieve a significant and lasting impact on burn care and prevention in both Bangladesh and Nepal and ultimately develop a model that can be replicated across the world.

Interburns would like to thank DfID for their generous support, as well as pay tribute to the many Interburns team members that have worked with us over the last 6 years in a voluntary capacity to bring the standards into being and make this ambitious programme possible.

Dr Tom Potokar
Director Interburns

Contributors

- Dr Keshav Das Joshi, General Surgeon, Nepal
- Dr Khima Nand Joshi, General Surgeon, Nepal
- Ms Pernilla Ardeby, Paediatric Nurse, Nepal
- Ms Nara Devi Bariya, Burns Nurse, Nepal
- Dr Ramnandan Prasad Chaudhary, Paediatric Surgeon, Nepal
- Dr Shankar Rai, Plastic Surgeon, Nepal
- Mr Stephen Knoble, Medical Training Consultant, Nepal
- Dr Shobha Chamania, General Surgeon, India
- Dr Rajeswari Dharmarajan, Burns Surgeon, India
- Dr Sachin Jamma, Plastic Surgeon, India
- Professor Sazzad Khondoker, Plastic Surgeon, Bangladesh
- Professor A.J.M Salek, Plastic Surgeon, Bangladesh
- Ms Monira Rahman, Executive Director, Acid Survivors Foundation, Bangladesh
- Dr Kishore Kumar Das, Plastic Surgeon, Bangladesh
- Dr Tim Sproule, Plastic Surgeon, Canada
- Dr Redouane Bouali, Critical Care Specialist, Canada
- Dr Shahla Yekta, Senior Researcher, Canada
- Dr Elbie Van der Merwe, Burns Surgeon, South Africa
- Dr Bruce Richard, Paediatric Plastic Surgeon, UK
- Dr Sian Falder, Paediatric Plastic Surgeon, UK
- Professor Patricia Price, Clinical Psychologist, UK
- RuthAnn Fanstone, Physiotherapist, UK
- Richard Bendell, Director of Operations Interburns, UK
- Dr Tom Potokar, Plastic Surgeon and Director Interburns, UK
- Mr Greg Healey, Businessman, UK
- Dr Amr Moghazy, Plastic Surgeon, Egypt
- Dr Michael Peck, Burns Surgeon, USA
- Dr Shariq Ali, Emergency Medicine, Pakistan
- Dr Richard Nnabuko, Plastic Surgeon, Nigeria

Setting Standards for Burn Care Services in Low and Middle Income Countries

Biographies

For complete biographies of all the contributors, please visit the Interburns website at: www.interburns.org.

Acknowledgements

This report was prepared following a consensus meeting held in Kathmandu, Nepal between the 21st and 24th January 2012. Interburns convened a group of 30 international burn care experts to build a consensus on operational standards for burn care services in LMICs, and the education and training necessary to support these services.

This publication builds on the work already conducted by Interburns in Asia and Africa and we would like to take this opportunity to thank all those people who have contributed to the development of educational and training resources, service evaluations and research, as well as those who have actively participated in training programmes on our behalf since 2006.

We would also like to thank the World Health Organization and International Society for Burn Injuries, particularly for the WHO Plan for Burn Care and Prevention which was a key document in initiating this effort towards establishing standards for burn care services.

The editor would like to thank all the participants at the consensus meeting, the hospitality offered by our Nepalese colleagues, the editorial support of Amr Moghazy and Mike Peck and the immense efforts of Richard Bendell and RuthAnn Fanstone in organising the meeting and assisting with the preparation of this report.

The Nepal consensus meeting was made possible by a generous grant provided by Vocational Training Charitable Trust, which funded several vital projects by Interburns through 2011 and 2012. Interburns would like to thank VTCT for their ongoing support for our work.

Interburns would also like to acknowledge and thank the Abertawe Bro Morgannwg University Health Board and the Welsh Centre for Burns & Plastic Surgery, Swansea, Wales for their continuing direct and indirect support towards the work of Interburns.

Interburns would like to thank the UK Department for International Development (DfID) for their funding and support for our project to implement the operational standards as a quality improvement tool in selected burn services in Bangladesh and Nepal through 2013-2016.

Executive Summary

The findings of this report are the result of a modified consensus process that took place between January and August 2012. The starting point for this process was a consensus meeting organised by Interburns with 30 expert burn care professionals from 10 countries held in Kathmandu, Nepal.

The fundamental philosophy underpinning the consensus process was the belief that every burn patient has the right to safe and effective care, irrespective of where they are treated in the world. This care should be compassionate, holistic and delivered by motivated, skilled and knowledgeable health care workers with access to adequate resources.

The objectives of the consensus meeting were:

- **To define operational standards for different levels of burn care service in LMICs**, including guidelines on the resources and activities necessary to ensure optimal outcomes for patients.
- **To develop a framework for education and training programmes in burn care** to provide burn care professionals in LMICs with the skills and knowledge necessary to meet the agreed operational standards.

The premises for setting the stated objectives were that:

1. The absence of internationally agreed operational standards for burn care represents a critical barrier to the consistent provision of good quality care in LMICs. Standards can be an effective benchmarking tool to drive change, but must be tailored to meet the specific challenges of burn injuries in LMICS. Standard setting is a crucial strategy for improving quality in health care, strengthening health systems, and enhancing patient outcomes in a cost-effective manner.

2. Effective education and training programmes are a vital tool in the delivery of standards, enabling burn care professionals to develop the skills and knowledge they need to achieve the standards and deliver good quality care. In order to be effective, educational and training programmes must be targeted to meet the specific challenges and needs of LMICs.

3. Operational standards and education and training programmes should be developed in parallel, so that standards inform the content, delivery and evaluation of training and education programmes. Education and training programmes are unlikely to lead to long-term and sustainable improvements in care and patient outcomes, unless their objective is to enable burn care services to meet well-defined operational standards.

Setting Standards for Burn Care Services in Low and Middle Income Countries

The outputs of the process presented in this report are:

- A set of agreed and attainable operational standards for burn care provision with respect to human resources, physical resources, equipment and activities for different levels of burns service (basic, intermediate and advanced).
- A list of the necessary knowledge and skills required at each level of burns service and a set of agreed educational principles to underpin the teaching of these and to ensure that knowledge translates into action.
- A commitment to undertaking an exploratory study to (I) review and benchmark existing services using the operational standards for burns services, and (II) measure the effectiveness of different models of education and training in delivering vital skills and knowledge according to the required standards for each level of burns service.

Burn injuries are a huge but preventable cause of mortality and morbidity in LMICs especially amongst children and young people. While these standards represent a crucial first step in improving the quality of burn care in LMICs, they are also intended to be a 'call to action' as well as a practical framework. Implementing these standards effectively and sustainably in LMICs will require long-term collaboration between the international burns community and policy makers, politicians, governments, health facilities, NGOs and international agencies.

While the global burden of burn injuries present an enormous challenge that will require concerted action over many years, with the right funding and support the implementation of effective operational standards has the capacity to transform the level of care burn patients receive around the world.

Part I – Background

1.1 Introduction

Burns has been described by the World Health Organization (WHO) as the ‘forgotten global public health crisis’. 11 million people a year suffer burns requiring medical attention. 95% are suffered by people living in LMICs, 70% of them children. In fact, burns are one of the top five global causes of injury affecting child mortality. The global epicentre of burns is South-East Asia: of the 320,000 global deaths from fire-related burns, over half (184,000) occur in this region. Two thirds of these burns affect females, primarily children and young women. The mortality rate from burns in HICs is lower than 1.0 per 100,000, but averages 16.9 deaths per 100,000 in South-East Asia, one of the highest discrepancies for any cause of injury.³

Burns are also a leading cause of disability and disfigurement: fire-related burns alone are estimated to cause 10 million disability adjusted life years (DALYS) per annum.⁴ In Nepal, burns are the second most common form of child injury and cause 5% of all disability in the country. In India, over 1,000,000 people suffer moderate to severe burns each year. In Bangladesh, more than 173,000 children are burnt every year.⁵ Many of these injuries and the disability they cause are entirely preventable. Estimates have indicated that ‘the provision of adequate burn care could reduce the time spent in hospital by 35% and the overall mortality rate by 30%’.⁶

The vast majority of burn patients are the poorest in society. Most LMICs have very limited burn care services, and consequently patients are treated in non-specialist health facilities by staff that lack training in burn care. Treatment is frequently delayed, inappropriate and inadequate. Patient follow up is problematic and rehabilitation services are often negligible or non-existent. Patients may be discharged before treatment is complete, due to lack of staff and other crucial resources or an inability to pay for even relatively simple treatments. Private burn facilities are scarce and unaffordable for most patients, and government facilities are frequently over-capacity and under-resourced.

In HICs the decrease in incidence of burn injuries over the last fifty years has meant that there has been a move towards centralised services, where the limited numbers of burn cases that are seen are looked after in specialised centres by well trained and experienced staff. Due to the high incidence of burn injuries in LMICs, there is a recognised need to decentralize and provide quality burn care services outside the few specialist centres that do exist. A serious barrier to the effective decentralisation of burn services is a lack of dedicated burn care professionals outside major metropolitan centres with access to effective training and adequate resources.

³Mock C, Peck M, Peden M, Krug E, eds. *A WHO plan for burn prevention and care*. Geneva, World Health Organization, 2008. p2.

⁴Peden M, McGee K, Sharma G. *The injury chart book: a graphical overview of the global burden of injuries*. Geneva, World Health Organization, 2002. p30.

⁵World Health Organization (WHO). Burns: *WHO Factsheet*. Factsheet No. 365 May 2012.
<http://www.who.int/mediacentre/factsheets/fs365/en/index.html>

⁶Albertyn R, Bickler S W, Rode H. *Paediatric burn injuries in Sub Saharan Africa—an overview*. *Burns Volume 32*, 2006. p611.

Setting Standards for Burn Care Services in Low and Middle Income Countries

Without defined operational standards and resource guidelines for burn care services in LMICs, it is difficult to target training and education programmes effectively, or measure whether they are leading to real change and improvements in the outcomes of burn patients. If international initiatives are to achieve long-term and sustainable improvements in burn care services in LMICs, an important first step is to agree on operational standards for these services, develop guidelines on the resources and activities required to meet these standards, and develop international education and training programmes designed to deliver the knowledge and skills essential to realising these standards. International strategies also need to be closely coordinated with burn care leaders living and working in LMICs, who fully understand the local context and can build relationships with government to drive sustainable improvements in burn care.

1.2 Operational Standards for Burns Services

Standard setting has proven to be a crucial strategy for improving quality in health care, strengthening health systems, and enhancing patient outcomes in a cost-effective manner. Trauma care studies have shown a reduction of medically preventable deaths by 50% after the implementation of standards for trauma management.⁷ Population and trauma registry studies show a fairly consistent reduction of 15-20% in mortality for better organised systems derived from effective standards.⁸

Through standard setting, a required service or outcome can be stated – for example all full thickness burns over a joint should be grafted - but it can be locally determined how this service will be provided, taking into account local factors such as limitations of equipment, staffing and skills, geographical isolation etc. Standards can be used to define the knowledge, skills, attitudes and resources necessary for achieving a certain level of care and to identify the learning outcomes required to treat patients in a timely and effective manner. They also provide a framework for monitoring and evaluating the level of service and measuring the effectiveness of training and education programmes, ensuring that they translate into improved care and better patient outcomes.

There are currently no internationally agreed operational standards for burn care. There is also a lack of guidelines defining the resources necessary, in terms of skills, knowledge, and equipment, to deliver a quality burn care service at different levels (i.e. basic, intermediate, and advanced burn care services).

In summary, the absence of standards for burns services has been a significant barrier to improving burn care in LMICs. Defining these standards for basic, intermediate and advanced levels of burn care service represents a crucial first step in developing a coordinated effort to deliver high quality burn care in LMICs.

⁷ Mock C, Mock C, Lormand JD, Goosen J, Joshipura M, Peden M. *Guidelines for essential trauma care*. Geneva, World Health Organization, 2004. p7.

⁸ Ibid. p7.

Whilst the challenges of implementing these standards should not be underestimated, there is a growing recognition of the need for these standards, both on the ground in LMICs and at the highest level of the international health community, and there has never been a better time to bring about a transformational change in global burn care.

1.3 Standards for Education and Training in Burn Care

Effective education and training programmes are critically important to the delivery of improved operational standards in LMICs. A multi-country survey conducted by Interburns in 2007 found that education and training for burn care in LMICs is extremely lacking. Interburns conducted needs assessments of burn care services in urban and rural areas of Nepal (2010, 2011), Bangladesh (2007, 2009, 2010, 2012) and India (2011, 2012). All of these studies have highlighted the need for effective training programmes and the creation of well-trained, dedicated burn care teams, identifying them as vital steps in improving outcomes for burn patients. The need to address the absence of effective training and education has been recognised at the highest international levels by both the ISBI and the WHO. However, training and education programmes are unlikely to lead to long-term and sustainable improvements in the standard of care and patient outcomes, unless their objective is to enable burn care services to meet well-defined operational standards.

The majority of existing international training and education programmes in burn care have been developed for HICs, and possess limited relevance and applicability in LMICs where the levels of technology, staff, and other resources are very different, as is burn aetiology, culture and the overall number of burn injuries. Most existing courses have not been evaluated in terms of their actual impact upon burn care. There is evidence that knowledge gained on training courses is not being translating into consistent changes in practice or tangible improvements in outcomes for burn patients. Any international strategy to improve burn care training in LMICs will need to close this 'knowledge to action' gap and address how the participant can bring about change in the facility in which he or she works. Monitoring and evaluation must be embedded into any programmes to assess their effectiveness and to provide a means for ongoing quality improvement.

Setting Standards for Burn Care Services in Low and Middle Income Countries

Part 2 - Setting Standards for Burn Care Services

The consensus meeting (21st -24th January 2012) sought to achieve a number of key objectives and outputs crucial to the development of effective standards for burn care services in LMICs.

2.1 Consensus Meeting Objectives

- Define operational standards for different levels of burn care service, including guidelines on the resources and activities necessary to ensure optimal outcomes for patients.
- Develop a framework for training and education programmes in burn care, to provide LMICs with the skills and knowledge necessary to meet the agreed operational standards.

2.2 Consensus Meeting Outputs

- A set of agreed and attainable standards with respect to human resources, physical resources, equipment and activities for different levels of burns service.
- A framework for training and education standards in LMICs based on the skills and knowledge required for different levels of burns service to meet the operational standards.
- A commitment to undertaking an exploratory study to (I) review and benchmark existing services using the operational standards for burns services, and (II) measure the effectiveness of different models of training and education in delivering vital skills and knowledge according to the training and education standards for each burn care service.

2.3 Issues Specific to Burn Care in LMICs

A broad range of issues have been identified as common barriers to best practice across a number of LMICs in Asia and Africa. These issues must be taken into account when developing effective standards tailored to meet the needs of burn care services in LMICs.

1. **The huge number of burn patients**, particularly in Government hospitals, which are duty bound to admit all presenting patients.
2. **The lack of primary prevention of burn injuries**, combined with the absence of legislation to prevent injuries or poor awareness and lack of enforcement of existing legislation.
3. **A dearth of decentralised burn care services**, which means a specialist hub in the capital or other major city often becomes inundated with patients from across the country.
4. **Poor communications and transportation infrastructure**, compromising access to burn care facilities and proper and timely treatment. This often contributes to the late presentation of patients and complication of treatment from infection and related factors, particularly in countries where geography increases the problems caused by poor transportation.
5. **The lack of training and education in burn care**, appropriate and relevant to resource-poor facilities operating in LMICs.
6. **A massive shortage of human resources**, especially in government facilities. In many institutions, there is a serious lack of nurses and many facilities are totally without physiotherapists. There is also limited understanding of the concept of dedicated burns professionals (both medical and nursing) with appropriate specialist skills in many LMICs.
7. **The absence of clinical standards, protocols, and guidelines** for burn care.
8. **Limited knowledge of first aid** leading to deeper and more extensive injuries.
9. **The late presentation of the patient**, especially in government and charitable or mission hospitals, leading to increased complications such as infection or contractures that make good care and outcomes more difficult to achieve. The absence of decentralised burn services is an important contributing factor, as patients may take days or weeks to reach the burn centre, particularly in countries where the terrain is challenging and many rural communities are remote or isolated.

Setting Standards for Burn Care Services in Low and Middle Income Countries

10. **Negative attitudes towards burns amongst health professionals.** Burns are often viewed in a negative light within the medical and nursing professions, with obvious negative consequences for the recruitment, motivation and retention of staff.
11. **The challenge of working with illiterate and / or un-educated patients,** where making the importance of a treatment or explaining the options available is more difficult. Many burns patients are extremely poor and are admitted in poor pre-admission state e.g. malnourished.⁹
12. **Corruption and political interference** in decisions that should be made on a purely medical basis.
13. **Poor coordination** between different types of facility and different levels of service.
14. **A lack of effective patient follow-up** due to many limiting factors.
15. **The presence of too many visitors and family members,** which makes management of burn ward areas and effective use of staff time more difficult.
16. **Cultural beliefs** and the use of immolation and self immolation as a form of punishment, suicide or a cry for help.
17. **A lack of relevant research** on best practices in burn care in LMICs.
18. **Limited specific training programmes** for medical or nursing staff.
19. **The absence of effective evaluation or monitoring** of burns services and educational programmes.

⁹High population density, illiteracy and poverty are the main demographic factors associated with a high risk of burn injury.⁷ Atiyeh B, Masellis A, Conte C. *Optimizing burn treatment in developing Low and Middle-Income Countries with limited health care resources (part 1)*. Annals of Burns and Fire Disasters, Volume XXII n. 3, September 2009. p123

2.4 Operational Standards

Burn care services must be guided by a set of operational standards which are appropriate and achievable in LMICs, taking into account the high numbers of burn patients, the level of health care infrastructure, and limited resources and manpower in these countries.

These standards are underpinned by the principle that every burn patient has the right to safe and effective care, irrespective of where they are treated in the world. This care should be compassionate, holistic and delivered by motivated, skilled and knowledgeable health care workers with access to adequate resources. The standards set out below provide the basic framework that the burn care resource matrices were developed from for each level of service. These standards are considered essential to the delivery of safe and effective burn care in LMICs:

1. Burn patients should be assessed and treated by health care workers who have had training appropriate to the level of service their facility provides (Basic, Intermediate or Advanced).
2. Where a facility is unable to provide the required skill level, burn patients should be transferred to a facility able to offer the appropriate treatment. Burn patients should receive immediate treatment that is safe and effective before they are transferred.
3. Burn patients with other significant co-existing trauma should be managed according to WHO trauma guidelines.
4. Burn patients with deep burns should be treated in a healthcare facility that can offer skin grafting.
5. Where appropriate, early excision and grafting is strongly encouraged.
6. All burn patients should receive adequate pain control from the first contact with the health care professional.
7. Burn patients should receive holistic treatment which addresses all their needs including surgical, nursing, physiotherapy, occupational therapy, dietary, psychological and medico-legal support. This is best provided by a multi-disciplinary team.
8. The provision of advanced care includes access to reconstructive surgery, advanced diagnostic facilities, blood bank, critical care, anaesthetists, hospital specialists and other services.
9. All burn care providers should ensure burn patients are mobilised, positioned and splinted as appropriate as soon as possible to minimise disability.
10. All burn care providers should ensure that burn patients receive optimal nutrition to maximise early wound healing.

Setting Standards for Burn Care Services in Low and Middle Income Countries

11. Paediatric care and therapy should be appropriate to the unique needs of the child.
12. Burn care should be delivered according to the agreed Consensus Burn Care Clinical Guidelines.
13. There should be a lead person with overall responsibility for burn care in each facility who is responsible for ensuring that the Guidelines are adhered to.
14. Facilities providing advanced care should have a designated area that is allocated only for burn patients.
15. Burn patients should be followed up by burn professionals to ensure holistic scar management, rehabilitation (physical and psychosocial) and access to reconstructive surgery following discharge from the health care facility.
16. Facilities treating burn patients should be adequately resourced, equipped and staffed to provide such care.
17. Specialist burn units should offer training and on-going support to health care professionals managing burns in other facilities within their region/district.
18. Specialist burn units should participate in research programmes where appropriate.
19. Burn patient data should be recorded at all levels of health care and a National Burn Register is recommended.
20. There should be a system for on-going inspection, quality control and quality improvement for burn care facilities.
21. Health care professionals involved in burn care at all levels should be engaged in burn injury prevention activities. Community involvement should be encouraged.
22. Specialist burn units and health care professionals should be engaging with policy-makers and health planners at all levels to ensure appropriate provision and delivery of burn care and burn prevention programmes.
23. The Ministry of Health should be responsible for ensuring that every burn patient in their country has access to the appropriate level of burn care to ensure equitable burn care provision.
24. The international burn care community has a critical role to play in recognising and supporting the implementation of these essential standards for burn care.
25. Burn injury disproportionately affects the poor. Fund-raising and advocacy for burn patients is essential to ensure access to appropriate care for all burn patients. Appropriate and timely burn care has been shown to significantly reduce the massive social and financial impact of burn injury.

2.5 Levels of Service

Health care facilities (Basic, District Hospital, Specialist and Tertiary Hospital) are often used as the end point for defining services, as in the WHO Trauma Care Guidelines. However, the consensus group agreed that defining the level of service provided was more appropriate for burn care. Expecting all district general hospitals (DGH) to reach a certain standard of burn care is unrealistic, and a better approach is to designate standards for a certain level of service: level 1 (Basic), Level 2 (Intermediate) and Level 3 (Advanced). This then allows for a specific facility such as a DGH to deliver an appropriate level of care based on local circumstances and resources.

Setting standards according to the level of burn care service enables the planning of services throughout a region to focus on the actual needs of the community rather than the type and level of existing facility in the region. This approach will enable burn care initiatives to deliver a real breakthrough in the quality of services.

2.6 WHO Trauma Resource Matrix

The WHO guidelines set achievable standards for trauma treatment services that could potentially be made available worldwide. They also define the resources required to ensure such care can realistically be delivered. These resources are organised in a 'resource matrix', which defines the knowledge, skills and physical resources (infrastructure, equipment and supplies) needed at different levels of health facility.

The knowledge and skills category assumes that staff will be able to access the training and continuing professional development necessary to impart the requisite knowledge and skills. Supplies and equipment are also detailed on the basis that they should be available to all patients and in good working condition at all times; they should not be restricted by a patient's ability to pay, for example. The original Trauma Resource Matrix has been modified based on discussion and feedback early in the consensus process. The significant changes were removing the categories 'essential', 'desirable' and 'irrelevant' to simplify the matrix and using 'level of burns service' rather than categorising by health care facility.

2.7 Burn Care Resource Matrix

Each Burn Care Resource Matrix below defines what each level of service should be capable of and the knowledge, skills and facilities and equipment that are required to ensure this capability. These levels are pyramidal in nature; i.e. all that is mentioned in level I is included in level II. Similarly, level III includes all the items under levels I and II. Higher level services support the education and training of lower levels in the same country and region; thus, advanced level services assist in the training of intermediate services and intermediate services support the training of basic services.

Setting Standards for Burn Care Services in Low and Middle Income Countries

Level I Service – Basic

Capability	Knowledge	Skills	Facilities / Equipment
Prevention	<ul style="list-style-type: none"> Local epidemiology of burns Available community support (e.g. schools, NGOs, local media) Basics of primary and secondary prevention 	<ul style="list-style-type: none"> Communication, ability to motivate local community 	<ul style="list-style-type: none"> Basic communication facilities, posters, banners etc Standardised paper / electronic registry form
First Aid	<ul style="list-style-type: none"> Stop, drop and roll Application of clean cool water to wounds Awareness of dangerous / bad practices 	<ul style="list-style-type: none"> Ability to demonstrate principles of first aid 	<ul style="list-style-type: none"> Simple props for demonstrations such as bucket of water
Assessment of burn injured patient	<ul style="list-style-type: none"> History taking ABC of immediate burn care Assessment of other injuries Symptoms and signs of inhalation injury Clinical assessment of depth and surface area of burn 	<ul style="list-style-type: none"> Appropriate history and clinical examination. Ability to prioritise airway (with c spine control), breathing and circulation Ability to accurately assess size and depth of burn wound and presence of other injuries, including inhalation 	<ul style="list-style-type: none"> Basic medical / nursing notes, stethoscope, blood pressure cuff
Simple emergency procedures	<ul style="list-style-type: none"> Basic airway management 	<ul style="list-style-type: none"> Jaw thrust, chin tilt, insertion of guedel airway, use of bag and mask. Insertion of iv cannula 	<ul style="list-style-type: none"> Guedel airway, bag and mask, iv fluids (saline or ringers lactate)
Clear communication & documentation	<ul style="list-style-type: none"> Local legal requirements Availability of local, regional burns services and contact phone numbers 	<ul style="list-style-type: none"> SBAR (Situation, Background, Assessment, Response) Clear, accurate and legible documentation 	<ul style="list-style-type: none"> Telephone
Safe transport	<ul style="list-style-type: none"> Local transport options, local burns services 	<ul style="list-style-type: none"> Patient preparation for safe transport 	<ul style="list-style-type: none"> Access to transport (taxi, rickshaw, ambulance etc)
Care of minor burns	<ul style="list-style-type: none"> Analgesia, cleaning & dressing wounds Correct positioning Recognition of burn depth and the progression of changes in appearance Signs & symptoms of infection 	<ul style="list-style-type: none"> Basic antisepsis, hand washing Cleaning wound and applying a dressing. Correct positioning. Assess wound for signs of infection 	<ul style="list-style-type: none"> Oral and injectable analgesics Antiseptic fluids and topical antimicrobials Simple dressings, POP

Level II Service – Intermediate

Capability	Knowledge	Skills	Facilities / Equipment
Advanced emergency procedures	<ul style="list-style-type: none"> Advanced airway management, central venous catheterization, escharotomy and fasciotomy 	<ul style="list-style-type: none"> Intubation, insertion of central line. Surgical decompression 	<ul style="list-style-type: none"> Laryngoscope, suction, bougiey, selection of ETT's, oxygen supply Central line kits, basic surgical set, access to theatre
Fluid management	<ul style="list-style-type: none"> Fluid resuscitation formula and maintenance fluids 	<ul style="list-style-type: none"> Implementing and monitoring fluid balance. Insertion of urinary catheter 	<ul style="list-style-type: none"> Urinary catheters, catheter bags, monitoring charts
In-patient care of minor & moderate burns	<ul style="list-style-type: none"> Indications for excision and grafting of burns and prioritizing areas Management of infected burns and delayed presentations Basics of nutrition and rehabilitation therapy Psychological/social support Specific requirements of children 	<ul style="list-style-type: none"> Tangential excision and skin grafting of small /moderate surface area burns Debridement of infected burns Pre and post-operative management of burns. NG feeding and nutritional supplementation Simple contracture release and burn reconstruction Physio-, socio- and psychotherapies Distraction and play therapy 	<ul style="list-style-type: none"> Specific ward or area of ward for patients Watson knife, mesher Laboratory support and blood transfusion facility NG tubes, nutritional supplements Specific physiotherapy area and equipment Play area for children
Training of level I staff	<ul style="list-style-type: none"> Appropriate educational material 	<ul style="list-style-type: none"> Simple teaching skills, and ability to motivate staff 	<ul style="list-style-type: none"> Laptop computer, printed material, flip chart

Setting Standards for Burn Care Services in Low and Middle Income Countries

Level III Service –Advanced

Capability	Knowledge	Skills	Facilities / Equipment
Comprehensive management of complicated and extensive burns	<ul style="list-style-type: none"> Advanced pathophysiology of burns Inhalation injury management Critical and Intensive care Advanced wound coverage modalities Sophisticated nutritional supplementation Complex reconstruction Long term and comprehensive rehabilitation 	<ul style="list-style-type: none"> Critical/intensive care skills for adults and children Advanced Plastic and Reconstructive Surgery skills (including microsurgery) Burns specific rehabilitation skills 	<ul style="list-style-type: none"> Specialized physical plant Designated critical care area Dedicated burns operating theatre Access to other specialties (e.g. renal, cardiology etc) Post discharge rehabilitation facilities
Training of level II staff	<ul style="list-style-type: none"> Appropriate educational material 	<ul style="list-style-type: none"> Advanced teaching skills Ability to motivate staff 	<ul style="list-style-type: none"> Digital camera, projector, lecture theatre/seminar room
Research and audit	<ul style="list-style-type: none"> Principles of research methodology and use of evidence informed practice Quality improvement framework Importance of general and targeted audit 	<ul style="list-style-type: none"> Ability to design, develop and implement research projects and audit Ability to lead quality improvement initiatives 	<ul style="list-style-type: none"> IT equipment (internet access, data management software) Data collection support Library
Policy & National Planning	<ul style="list-style-type: none"> Health service structure, governmental and non-governmental initiatives relevant to burns Familiarity with regional burn care resources 	<ul style="list-style-type: none"> Develop working relationship with health/planning ministries Develop strategic level national framework plans Collaboration with other burn centres in the region 	<ul style="list-style-type: none"> Access to data Administrative support

2.8 Principles of Education and Training to Support Burn Care Standards

In order for burn care in LMICs to reach the agreed operational standards, there must be effective education and training to support the knowledge and skills necessary at each level of burn service (as delineated in the 'Knowledge' and 'Skills' columns in the resource matrices). There are a number of well established and excellent courses that focus on the emergency care of major burn injuries. However, these have been developed in and for HICs and whilst they contain some generic information that is relevant to all burns services, they have not been specifically developed to meet the particular needs and challenges of LMICs. Aside from these courses, there are many other methods of imparting knowledge including fellowships, mentoring, web based learning, targeted workshops etc.

Many traditional methods depend on imparting a series of facts, which are frequently retained for only a short period and rarely lead to changed practices and improved outcomes. It is absolutely essential that any educational material or training programmes are both relevant to the local situation and focus on the knowledge to action process. This means that the barriers and facilitators to implementing best practice need to be carefully assessed and the end point must not be knowledge itself, but putting the knowledge into practice on a daily basis.

Modules need to be developed to address the specific knowledge, skills and attitudes required at each level of service. Each module must have clear learning outcomes and systems in place to monitor whether there has been a change in ability, behaviour and outcomes. These modules can be delivered in a variety of different ways tailored to the specific circumstances and needs in a country or region, but with the same end goal in mind: enabling burn care services to meet the agreed operational standards.

The following underlying principles should apply to all education and training activities and programmes:

1. Educational courses should be internationally recognised, and must be specifically designed to enable facilities to meet the agreed operational standards at the appropriate level of burn care service (basic, intermediate or advanced) for low and middle income countries.
2. Implementation and sustainability of knowledge translation will be fostered by local ownership, engagement with local policy makers and building long-term partnerships.

Setting Standards for Burn Care Services in Low and Middle Income Countries

3. Effective Monitoring and Evaluation of training and education is essential to ensure continuous quality improvement by translating knowledge into action.
4. Training and education are best delivered by a comprehensive and adaptable portfolio that is:
 - Based on delivering the skills and knowledge necessary to achieve agreed operational standards
 - Tailored for basic, intermediate and advanced levels of care
 - Flexible and progressive
 - Sensitive and responsive to local and cultural needs
 - Inspirational, interactive and evidence-informed
 - Relevant to all health care professionals working with burns
 - Multidisciplinary including non-medical components
 - Based on mutual and continued partnership
 - Focused on translating knowledge into action

2.9 Conclusion

Burn injuries remain a significant cause of preventable morbidity and mortality throughout much of the world, with the high incidence rate often exceeding the capacity of medical facilities on a daily basis, without even taking into account the additional burden of mass casualties from accidents, natural disasters and acts of aggression. If a disaster is defined as a situation where the local ability to cope with a situation has been overwhelmed, then the majority of health care facilities in LMICs treating burn patients are in a disaster situation on a daily basis. This situation cannot be allowed to continue.

There is growing international momentum to address this long neglected area of health care, which has so often been overlooked in favour of other pressing public health issues. In 2008 the WHO published a plan for burn care and prevention highlighting the existing major gaps and setting out a strategic plan for governments, national and international organizations. It highlighted the importance of concerted multi-sectoral efforts, strong partnerships and international cooperation to take this agenda forward. That report and the WHO's *Guidelines for Essential Trauma Care* provided a solid foundation on which to build effective standards for burn care in LMICs.

The operational standards and resource matrices outlined in this report represent an important first step in developing a coordinated international effort to improve the provision of burn care. They provide a clear framework for the development of burns services in LMICs where the epidemiology, incidence, outcomes, and the facilities available to treat burns are very different to HICs and the circumstances significantly more challenging. Most importantly, these standards have been developed in consultation with expert burn care professionals who possess a wealth of experience of working in LMICs and meeting the challenges of providing good quality care despite limited resources.

An analysis of the current situation provided by those working in burn care in LMICs identified a number of critical barriers to implementing effective burn care and recognised the need for the standards to be categorised by level of burn service rather than level of health care facility. The needs of burn services were categorised as basic (Level 1), intermediate (Level 2) and advanced (Level 3). Achievable operational standards (capabilities) have been defined for each of these levels of burns service, along with the appropriate knowledge, skills, equipment and facilities to support these capabilities.

Education and training programmes have a critical role to play in providing burn care professionals in LMICs with the skills and knowledge they need to deliver the agreed operational standards. The learning outcomes of these programmes should be derived from the operational standards for the appropriate service level and should be monitored and evaluated according to their effectiveness in delivering real change in ability, behaviour and patient outcomes, not just knowledge transfer.

While these standards represent a crucial first step in improving the quality of burn care in LMICs, they are intended to be a 'call to action' as well as a practical framework. Implementing these standards effectively and sustainably in LMICs will require long-term collaboration by the international burn community with policy makers, politicians, governments, health facilities, NGOs and international agencies. While the global burden of burn injuries present an enormous challenge that will require concerted action over many years, the implementation of effective standards of burn care has the capacity to transform the level of care burn patients receive around the world.

Setting Standards for Burn Care Services in Low and Middle Income Countries

2.10 Next Steps

A clear plan of action is necessary to ensure that the work highlighted in this report bears fruit. This must include a comprehensive study with the following objectives:

- I. To review and benchmark existing services using the operational standards for burns services at basic, intermediate and advanced levels.
- II. To develop capacity to enable a cohort of burns services to achieve the standards set out in this document.
- III. To provide education and training to develop and maintain the required knowledge and skills.
- IV. To evaluate the effectiveness of different models of education and training.
- V. To assess the overall impact of this approach on service delivery and patient outcomes.

Complex intervention research is notoriously difficult, particularly when undertaken in a LMIC. However, effective evaluation is essential to ensure that education and training programmes are achieving their objectives, and ongoing monitoring essential to ensure that they continue to do so in a sustainable manner. The use of techniques such as peer ethnographic evaluation and research (PEER) will facilitate a rapid approach to programme design, monitoring, evaluation and research, build a dialogue between programmes and communities and provide a voice for marginalized groups. This type of scientific methodology will be the most appropriate and will form the focus for the proposed study.

It is crucial that the international burn community mobilises funding, logistical support and volunteer expertise rapidly to maintain the momentum built up by the WHO burn reports and the Nepal Consensus Meeting. This report is not intended merely to stand alone as an academic document or intellectual framework for improving care, but as a necessary first step in developing, implementing and sustaining improved standards of burn care in LMICs. We call

on international agencies, governments NGOs and health care professionals to mobilise their networks and resources, to ensure that this report is merely the first stage of a concerted international effort to drastically reduce the global burden of death and disability from burns and transform the standard of care provided to patients.

Update 2013

Interburns is pleased to announce that it has been awarded a grant by the UK Department for International Development (DfID) to implement the operational standards in Bangladesh and Nepal over the next 3 years (2013-2016). This project will involve working closely with colleagues in Bangladesh and Nepal, assessing and supporting 10 burn units in the two countries, developing tailored training programmes to support Basic, Intermediate and Advanced level services, and delivering this training to 600 burn care professionals, while training a further 150 as instructors to disseminate training throughout both countries. This programme will also develop a range of innovative monitoring and evaluation tools, to measure the effectiveness of the standards in improving services and ensure that the training and support we provide translates into improved outcomes for burn patients, including the first Patient Reported Outcome Measures (PROMS) designed specifically for burn patients in LMICs.

With DfID's support, Interburns is evolving the standards into a quality improvement tool that will enable burn services in LMICs to identify gaps in the care and prevention they offer, including the lack of key operational capabilities, staff training or knowledge, or vital equipment and facilities. Through a range of support, including tailored training programmes developed specifically to support the standards and a range of patient and clinician-focused outcome measures, Interburns and its local partners will help to close these gaps and drive sustainable improvements in the capacity and effectiveness of services.

Appendix: Methodology and Summary of Activities

The Consensus Process

Participants in the consensus meeting were selected based on their commitment, knowledge and experience of burn care in LMICs. All participants are in a leadership position in a burn care service, and the majority have influence at national and international levels in the provision of burn care.

The consensus meeting was held over four days in January 2012 in Kathmandu, Nepal. Consensus was achieved through cycles of small and full group discussions, workshops and group feedback. Consensus statements were developed from the key themes that arose from small and large group discussions. These statements were collected and drafted by small working parties, which were then fed back to the group.

All consensus statements were finalised in consultation with the whole group and unanimously agreed by all participants.

Days 1 and 2: Training and Education Programmes

The meeting began with a 'setting the scene' session, in order to understand the complex global picture of burn care and the varying needs for training and education in a diverse range of LMICs. This focused the meeting from the outset on the real issues facing burn care on the 'front line', and encouraged the discussions to be realistic and applicable to the working context of LMICs, while retaining the aspirational aim of 'transforming burn care'.

Participants were asked to present a situational analysis of their institution under the following headings: introduction and general background, epidemiology, human resources, physical resources, training and education needs, barriers and facilitators to implementing best burn care, current outcomes. There were six further presentations specifically on training and education in burns according to profession e.g. surgeon, therapist, nurse.

Each presenter was asked to draw on his or her own experience and knowledge, examining strengths, weaknesses and areas for improvement in existing training and education programmes, while identifying priority areas for learning which would have the greatest impact upon patient outcomes at their burn care facility. They were also asked to think about their professional speciality and identify which personal attributes have the biggest impact in improving patient care and outcomes. Lastly, presenters shared 100% between 'knowledge', 'attitudes' and 'practices' to highlight the relative importance of each in transforming services.

Setting Standards for Burn Care Services in Low and Middle Income Countries

Days 3 and 4: Levels of Service & Operational Standards

In order to provide a recognised structure for the standard setting exercise, the meeting utilised the framework of the World Health Organization's *Guidelines for Essential Trauma Care*, published in 2004. While the *Trauma Guidelines* include a short section on burn care (see below), this meeting focused in far greater detail on burn care, in recognition of the significant differences between burns and other major forms of trauma. The standards agreed at the consensus meeting share the same underlying premise as the *Guidelines*: 'that improvements in organization and planning can result in improvements in trauma (burn) treatment services and hence in the outcome of injured persons, with minimal increases in expenditure.'¹⁰

TABLE 10 Burns and wounds

Resources	Facility level			
	Basic	GP	Specialist	Tertiary
Burns				
Assessment of depth and extent	E	E	E	E
Sterile dressings	D	E	E	E
Clean dressings	E	I*	I*	I*
Topical antibiotic dressings	D	E	E	E
Debridement	I	PR	E	E
Escharotomy	I	PR	E	E
Skin graft	I	PR	E	E
Early excision and grafting	I	I	D	D
Physiotherapy and splints to prevent contractures in burn wounds	I	E	E	E
Reconstructive surgery	I	I	D	E
Wounds				
Assess wounds for potential mortality and disability	E	E	E	E
Non-surgical management: clean and dress	E	E	E	E
Minor surgical: clean, suture	PR	E	E	E
Major surgical debridement and repair	I	PR	E	E
Tetanus prophylaxis (toxoid, antiserum)	D ¹	E	E	E

* Irrelevant, as clean dressings are superseded by sterile dressings at all hospital levels.

¹ Tetanus prophylaxis should be essential at any basic facility at which there is refrigeration.

11

Like the *Guidelines*, the consensus standards for burns are concerned only with the care of the injured - including secondary and tertiary prevention of injury-related death and disability - and not directly with primary prevention. Primary prevention of burns was recognised as being of great importance in reducing death and disability from burns, but it falls outside the specific focus of the meeting. Similarly, pre-hospital care such as first aid is vitally important for treating burn injuries, as many patients present late at hospital and others do not arrive, but this also falls outside the scope of the consensus meeting.

¹⁰ Mock C, Lormand JD, Goosen J, Joshipura M, Peden M. *Guidelines for essential trauma care*. Geneva, World Health Organization, 2004. p1.

¹¹ Source for WHO Resource Matrix. Ibid. p44.

References

- Ahuja, R, and Bhattacharya, S. *ABC of Burns: Burns in the developing world and burn disasters*. British Medical Journal. Volume 329, 21 August 2004, p447-449.
- Albertyn R, Bickler S W, Rode H. *Paediatric burn injuries in Sub Saharan Africa—an overview*. Burns Volume 32, 2006. p605–612.
- Atiyeh B, Masellis A, Conte C.
 - *Optimizing burn treatment in developing Low and Middle-Income Countries with limited health care resources (part 1)*. Annals of Burns and Fire Disasters, Volume XXII n. 3, September 2009.
 - *Optimizing burn treatment in developing Low and Middle-Income Countries with limited health care resources (part 2)*. Annals of Burns and Fire Disasters, Volume XXII, n. 4, December 2009.
 - *Optimizing burn treatment in developing Low and Middle-Income Countries with limited health care resources (part 3)*. Annals of Burns and Fire Disaster, Volume XXIII, n. 1, March 2010.
- Chandran A, Hyder A, Peek-Asa C. *The Global Burden of Unintentional Injuries and an Agenda for Progress*. *Epidemiologic Reviews*, Volume 32, June 2010.
- Forjuoh, S.N. *Burns in low- and middle-income countries: A review of available literature on descriptive epidemiology, risk factors, treatment, and prevention*. Burns Volume 32, 2006. p529–537.
- Garcia-Moreno, C. *Gender inequality and fire-related deaths in India*. The Lancet, Volume 373, Issue 9671, Pages 1230 – 1231
- Gwatkin D, and Guillot M. *The burden of disease among the global poor: current situation, future trends, and implications for strategy*. The World Bank, 2000.
- Holmes J, *Critical Issues in Burn Care, Journal of Burn Care & Research*, November/December 2008, Volume 29 Issue 6 p180-7.
- Mashreky S, Rahman A, Chowdhury S M, Giashuddin S, Svanstrom L, Linnan M, Shafinaz S, Uhaa I, Rahman F. *Epidemiology of childhood burn: Yield of largest community based injury survey in Bangladesh*. Burns Volume 34 (6), September 2008. p856-62.
- Mathers C, Stevens G, Mascarenhas M. *Global Health Risks: Mortality and burden of disease attributable to selected major risks*. World Health Organization 2009.
- Mock C, Lormand JD, Goosen J, Joshipura M, Peden M. *Guidelines for essential trauma care*. World Health Organization, 2004
- Mock C, Abantanga F, Goosen J, Joshipura M, and Juillard C. *Strengthening care of injured children globally*. Bulletin of the World Health Organization 2009, 87. p382–389.

Setting Standards for Burn Care Services in Low and Middle Income Countries

- Mock C, Peck M, Juillard C, Meddings D, Gielen A, McKenzie L (eds). *Burn prevention: success stories, lessons learned*. World Health Organization, 2011.
- Murray C and Lopez A. *Mortality by cause for eight regions of the world: Global Burden of Disease Study*. The Lancet 1997; 349. p1269–76
- National Burn Care Review Committee. *Standards and Strategy for Burn Care: A Review of Burn Care in the British Isles*. British Burn Association 2001.
- Peck M. *Epidemiology of burns throughout the world. Part I: Distribution and risk factors*. Burns, Volume 37, 2011. p1087-1100.
- Peden M, McGee K, Sharma G. *The injury chart book: a graphical overview of the global burden of injuries*. World Health Organization, 2002.
- Peden M et al. *World Report on Child Injury Prevention*. World Health Organization, 2008.
- Potokar T, Ali S, Bouali R, Walusimbi M, Chamania S. *Training of medical and paramedical personnel in burn care and prevention*. Indian Journal of Plastic Surgery Supplement 1 2010 Volume 43.
- Potokar T, Ali S, Chamania S, Prowse S, Whitaker I. *A global overview of burns research highlights the need for forming networks with the developing world*. Burns, 2008 Volume 34, Issue 1, Pages 3-5.
- Sanghavi P, Bhalla K, Das V. *Fire-related deaths in India in 2001: a retrospective analysis of data*. The Lancet 2009; 373. p1282–88.
- Southgate L, Hays R, Norcini J et al; *Setting performance standards for medical practice; A theoretical framework*: Medical Education Volume 35, Issue 5 p47-81, May 2001.
- Szlezák, Nicole. *Linking Knowledge and Action in Global Health - Current Concepts, Approaches, and Institutions*. CID Graduate Student and Postdoctoral Fellow Working Paper No. 12. Center for International Development at Harvard University, August 2006.
- Thamlikitkul V. *Bridging the gap between knowledge and action for health: Case studies*. Bulletin of the World Health Organization, August 2006 84(8):603-7.
- Wojtczak A, Schwartz R; *Minimal essential requirements and standards in medical education*. Medical Teacher Volume 22, No 6, 2000. p555-9.
- World Health Organization (WHO). *Bridging the “Know-Do” Gap: Meeting on Knowledge Translation in Global Health (10–12 October 2005)*. World Health Organization 2006.
- World Health Organization (WHO). *Burns: WHO Factsheet*. Factsheet No. 365 May 2012. <http://www.who.int/mediacentre/factsheets/fs365/en/index.html>





Setting Standards for Burn Care Services in Low and Middle Income Countries



Interburns

Welsh Centre for Burns & Plastic Surgery
Swansea, SA6 6NL
Wales, UK

Contact: office@interburns.org

Interburns is a charity registered in England and Wales (charity number 1122299)

www.interburns.org