



British Burn Association

Outcome Measures for Adult and Paediatric Services  
Second Edition

## Introduction to the 1st Edition

This document is the product of a process which started at the 44th annual British Burn Association (BBA) scientific conference at Salisbury in March 2011. At that meeting, the BBA Outcomes Group was formed from a team of multi-disciplinary volunteers with the aim of defining simple, measurable quality indicators at various stages on the burn patient's care pathway. Under Remo Papini's chairmanship, the group met on several occasions over the subsequent year prior to his departure for Australia in July 2012. At his request, I agreed to take on the task of finalising the completed document. This was circulated in draft form to the BBA membership for comment in August 2012 and the final version given here incorporates some of the suggestions received.

The core membership of the outcomes group is set out in the BBA Subgroup Terms of Reference (October 2010) and includes experienced clinicians from all sections of the burns multi-disciplinary team, as well as managers and commissioners. On occasions, other individuals were seconded to the group for their specialist knowledge or advice. All those who contributed to the group discussions gave their time and energy generously.

Measuring the outcome of burn care is notoriously difficult. As expected, producing a list of outcome measures on which the whole group agreed required patience, time and a great deal of argument and discussion. The Outcomes Group have tried to produce a rational but aspirational document, seeking the very best for patients rather than simply what might be achievable within current constraints. While some measures are blindingly obvious, others may seem less than ideal and may change or evolve with time and use. All are meant as starting points on which future iterations can build.

We hope that the document will provide burn services with a sensible toolkit for use in internal audit and facilitate performance comparisons between burn services. 'Outcome Measures for Adult and Paediatric Burn Services' is designed to complement the National Burn Care Standards of January 2013.

### **Peter Drew**

Chairman, BBA Outcomes Group

### **Core Membership**

Menna Davies, Jacky Edwards, Gabrielle Fairgrieve, Sarah Gaskell, Nathan Hall  
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## Foreword to the 2nd Edition

With the publication of the first edition of 'Outcome Measures for Adult and Paediatric Burn Services' in late 2012, the BBA outcomes sub-group came to the end of its term and was disbanded. However in 2014, at the request of the BBA chair, I agreed to re-constitute the group with the aim of reviewing and revising the document for a second edition. Nominees were sought from the membership, and a ballot produced the core group members listed below with representation from all areas of the burns MDT as required by the group's terms of reference. Patient representation on BBA sub-committees has been difficult to find, so I am especially grateful to Bethan Hughes for agreeing to get involved.

In the second edition presented here, we have drawn on many sources and publications from around the world, including those from other national burn associations [1-2]. We have kept in mind the aims and purpose of the first edition (i.e. to produce a rational but aspirational document, seeking the very best for patients rather than simply what might be achievable within current constraints) but have reduced and simplified the outcome measures listed. In doing so, we have brought the BBA outcome measures more into line with those published internationally.

Some measures from the first edition were deemed too difficult to measure accurately and were removed (e.g. healing time), while some new measures were included knowing that they are not yet fully developed in the UK (e.g. validated PREMs for burns patients). We have also adopted the layout of the NHS Outcomes Framework (2014), which divides outcome measures into five domains covering patient safety, experience and the effectiveness of treatment. We have also categorised measures into those of process and of clinical outcome. Some of the measures listed in this document match those in the Burn Care Clinical Reference Group (CRG) quality dashboard, while others do not. This, we believe, reflects the different purposes of these two entities.

As with the first edition of the document, we hope that members find this document a useful tool when considering their own performance and that of other services.

**Peter Drew** - Chairman

### **Core Membership**

Joanne Bowes – Anaesthetics & Intensive Care  
Menna Davies – Physiotherapist  
Roy Dudley-Southern – Layperson  
Peter Dziewulski – Burn Surgeon

Jacky Edwards – Burns Nurse  
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## Introduction to the 2<sup>nd</sup> Edition

The overall strategic treatment and care outcome objective for burn care services is to minimise unexpected deaths and complications from burn injury. In that context they enable recovery and return to pre-injury status as far and as quickly as possible. Where appropriate that may include restoration of physical and psycho-social function, and minimising the implications of any long-term disability and scarring. It may also include return to education or employment and to previous roles within their family and wider social network.

Patient-specific clinical outcomes, process outcomes and experience, as described in the following sections of this document, have been considered in terms of their contribution to the achievement of the overall service outcome objectives.

## Glossary of Terms

Burn Injury	The term 'burn' describes an injury caused by the transfer of energy to tissues, causing cell death and the destruction of tissue architecture. Cutaneous burns arise from a variety of causes, including contact with hot liquids (scalds) or surfaces (contact burns), fire, chemicals, electricity and radiation.
Burn Services	NHS services providing specialised care for patients with burn injuries. These are stratified into centres, units and facilities.
Calculated Mortality Risk	An estimate of the risk of a particular patient dying as a result of a burn injury. The formula used to calculate this risk takes account of variables including the extent and location of the burn, the patient's age, sex and co-morbidities.
Clinical Measures	A clinical measure is used to assess the extent to which a patient is deviating from the recognised 'normal' level. This provides an objective way by which the progress of treatment can be rapidly assessed and any corrective action taken.
Clinical Outcome	The results of treatment.
ED	Emergency Department. Often referred to in the UK as an Accident & Emergency (A&E) Department.
EMSB	Emergency Management of Severe Burns. An educational course run by the British Burn Association (BBA).
Family	A patient's family is defined as a group of people drawn together by ties of blood, marriage (formal and informal) and/or close friendship.
iBID	International Burn Injury Database. A database containing the details of patients treated for burns in hospitals in England and Wales from 2003 onward.
ITU	Intensive Therapy Unit. May also be referred to as an Intensive Care Unit (ICU) or Intensive Treatment Unit (ITU). A department within hospitals providing care for patients with severe and life-threatening illnesses and injury.

MDT	Multi-Disciplinary Team. A team of professionals directing the management of patients with a specific condition.
MUST	Malnutrition Universal Screening Tool
Objective	A thing aimed at or sought; a goal.
Outcome	Something that happens as a result or consequence of an activity or process.
Physical Function	The ability to carry out actions considered essential for maintaining independence and other more complex activities which, while they may not be considered strictly 'necessary', may have a significant impact on quality of life. Comparison can be made with abilities that might be considered 'normal' for someone of the same age and sex.
PREMs	Patient Recorded Experience Measures.
Process Measures/Outcomes	Measures that assess how well parts of a healthcare system are performing in comparison to previously agreed standards.
PROMs	Patient Reported Outcome Measures.
Psycho-Social Function	The psychological ability of an individual to function in relation to their social environment. This also takes account of the individual's sense of wellbeing.
Structural Outcomes	Structure describes the context in which care is delivered, including hospital buildings, staff, financing, and equipment.
TBSA	Total Body Surface Area
Telemedicine	The use of telecommunication and information technologies to provide clinical healthcare when the patient and clinician providing specialist advice are at a distance from each other. It helps eliminate distance barriers and can improve access to medical services that would often not be consistently available in distant rural communities.

Domain 1. Mortality - Preventing People from Dying Prematurely		
Desired Outcome	Measure	Type
1. Optimal Survival	a. Number of patients dying with a calculated mortality risk predicting probable survival b. Number of patients surviving with a calculated mortality risk predicting probable non-survival	Clinical  Clinical
Notes:	<ul style="list-style-type: none"> <li>• Calculation of mortality risk is based on British data from iBID using the method outlined in 'A model of British in-hospital mortality among burn patients' Stylianou, Buchan &amp; Dunn. Burns. 2014; 40: 1316 – 1321 [3].</li> <li>• Unexpected deaths are those for whom the calculated mortality risk is &lt;25%.</li> <li>• Unexpected survival is defined as survival when the calculated mortality risk is &gt;75%.</li> </ul>	

Domain 2. Enhancing Quality of Life (see also Domain 3 – Rehabilitation)		
Desired Outcome	Measure	Type
<b>Pre Specialist Burn Care</b>		
2. Accurate Area Assessment	ED burn area assessment within $\pm$ 10% TBSA of Burn Service assessment	Clinical
Notes: <ul style="list-style-type: none"> <li>• Burn area assessment is key in determining optimal management.</li> <li>• Accurate ED burn area assessment is crucial, as it helps determine the correct treatment path and level of care required [4].</li> <li>• Burn services can assist referring EDs in making accurate burn area assessments in a number of ways:               <ul style="list-style-type: none"> <li>– In the acute situation, these include consultation via telemedicine, telephone advice and chart review [5].</li> <li>– In the longer term, teaching events and courses such as EMSB may help [6].</li> </ul> </li> </ul>		
3. Appropriate Referral	Number of patients admitted to an inappropriate level of care	Process
Notes: <ul style="list-style-type: none"> <li>• See ‘National Burns Care Referral Guidance’ Feb 2012 [7].</li> <li>• Guidance is based on the principles of the National Burn Care Review 2001 (Standards and Strategy for Burn Care, A Review of Burn Care in the British Isles. National Burns Care Review Committee 2001).</li> <li>• Clinical consensus suggests that prompt access to specialised burn centres for patients with complex or severe injuries is linked to improved outcomes. Admission to a service that cannot provide the level of care needed is detrimental.</li> <li>• Nationally consistent referral guidance supports equity of access to specialised burn care services [8-12].</li> </ul>		
<b>Specialist Burn Care</b>		
4. Effective Clinical Management	Patients with burns requiring IV fluid resuscitation are examined by a Consultant Burns Surgeon within 12 hours of presentation.	Process
Notes: <ul style="list-style-type: none"> <li>• The consensus view of the committee is that this sets a sensible and professional standard.</li> </ul>		
5. Optimal IV Fluid Resuscitation	IV fluid resuscitation commenced within 1 hour of presentation if burn area above threshold (i.e. $\geq$ 10% TBSA burn in children or $\geq$ 15% TBSA burn in adults)	Clinical



Notes: <ul style="list-style-type: none"> <li>• Early fluid resuscitation improves outcomes in both severely burned children [13] and adults [14].</li> </ul>		
6. Prompt Wound Care	Burn wound cleaned and dressed within 6 hours of presentation	Clinical
Notes: <ul style="list-style-type: none"> <li>• Burn injury removes the epidermal barrier to microbial ingress and increases evaporative heat loss.</li> <li>• Early wound cleaning and application of a dressing controls bacterial colonisation and provides a moist environment for wound healing [15].</li> </ul>		
7. Effective Surgical Management	All full-thickness burn removed within 5 days of presentation	Clinical
Notes: <ul style="list-style-type: none"> <li>• ‘Early’ burn wound excision is defined variously as excision between 24hrs and 7 days after injury.</li> <li>• The consensus of the committee was that a 5 day time point was reasonable.</li> <li>• Early, aggressive surgical debridement of deep burns when possible has become the norm in most developed countries [15,16].</li> </ul>		
8. Adequate Nutrition	a. All patients screened using an appropriate tool within 24 hours of presentation and referred to a dietician if concerns identified.	Process
	b. All patients with $\geq 10\%$ TBSA burn in children or $\geq 15\%$ TBSA burn in adults are assessed by a dietician within 24 hours of presentation and daily thereafter until nutritionally stable.	Clinical
Notes: <ul style="list-style-type: none"> <li>• This measure only applies to adults and children over the age of 12.</li> <li>• Most centres use a MUST tool, although local alternatives may also be used.</li> <li>• The MUST tool is cited in NICE guidance [17].</li> </ul>		

### Domain 3. Rehabilitation - Helping People to Recover Following Injury

Desired Outcome	Measure	Type
9. Optimal Functional Recovery	<p>a. All patients screened for functional morbidity using a locally agreed screening protocol within 24 hours of presentation to the burns service.</p> <p>b. All patients identified as having functional morbidity assessed by an occupational therapist and/or physiotherapist within 72 hours of presentation to the burns service.</p> <p>c. Repeated measures using a tool selected to reflect the agreed goals identified by the patient in conjunction with the therapist, are completed at agreed intervals until one of the following is achieved:</p> <ul style="list-style-type: none"> <li>• Normal values for age or population.</li> <li>• Pre-burn functional status.</li> <li>• Patient self-perception of outcome is within a range acceptable to them.</li> </ul> <p>d. The score obtained by the selected measurement tool demonstrates that the patient's goals have been met and/or an improvement over time has occurred.</p>	<p>Process</p> <p>Clinical</p> <p>Clinical</p> <p>Clinical</p>

- Notes:
- Burn trauma ranges from minor burns to devastating injuries, and can impact on peoples' function to varying degrees. Measurement and evaluation of functional outcome in burns patients is therefore equally complex and multi-factorial. An extensive literature search has highlighted the diverse range of tools commonly used to measure functional outcomes in burn injured patients. There is insufficient data on the use of outcome measurement tools in the burn population to advocate for the use of one specific tool. Thus, there is a lack of consensus within the clinical and scientific burn community regarding which outcomes should be assessed, how they should be measured, and at which stage of the recovery process they should be administered [18-20].
  - A collection of measurement tools validated for use with a burn-injured population is listed in Appendix I. These measurement tools have been selected as they are considered to be simple to administer, reducing respondent and administrator burden and ensuring the feasibility for long-term use across multiple services. One or more tools may be selected, depending on the goals agreed by the patient and therapist. Many of the measurement tools validated for use in adult burn populations may also provide useful information in a paediatric burn population.



Domain 4. Experience - Ensuring People have a Positive Experience of Care		
Desired Outcome	Measure	Type
11. Adequate Background & Breakthrough Analgesia	Pain assessed and recorded daily using an appropriate assessment tool.	Process
Notes: <ul style="list-style-type: none"> <li>• 2-4 hourly in the acute phase. Minimum of 12 hourly in the pain controlled patient to ensure optimal management of pain is maintained.</li> <li>• Pain scores (e.g. visual analogue or numerical scales) are an effective method of assessing pain.</li> <li>• Regular pain assessment should result in analgesia being offered if appropriate [27].</li> </ul>		
12. Adequate Control of Procedural Pain	Pain assessed and recorded at each potentially painful intervention such as wound cleaning, dressing change, physiotherapy and occupational therapy.	Process
Notes: <ul style="list-style-type: none"> <li>• Pain management should be early and effective in order to improve compliance with treatment and psychological outcomes [28].</li> <li>• Pain scales must be appropriate for the age and cognitive ability of patient [29].</li> <li>• Appropriate pain management will facilitate the following:               <ul style="list-style-type: none"> <li>– Full patient participation in normal daily activities.</li> <li>– Acceptable level of comfort during wound care and rehabilitation [30].</li> </ul> </li> <li>• Negative consequences of poor pain control include:               <ul style="list-style-type: none"> <li>– Poor rehabilitation compliance, increased pain perception and incidence of chronic pain [27].</li> <li>– Post traumatic stress disorder [30].</li> <li>– Poor wound healing [31].</li> <li>– Increased length of hospital stay [32].</li> </ul> </li> </ul>		
13. Positive Patient Experience	Patient Reported Experience Measures (PREMS)	Experience
Notes: <ul style="list-style-type: none"> <li>• There are no validated PREMs for burns patients available at the time of publication.</li> <li>• Local tools can be used for internal audit within a particular service, but cannot be used for comparison with other services.</li> </ul>		

Domain 5. Safety - Treating and Caring for People in a Safe Environment and Protecting them from Avoidable Harm		
Desired Outcome	Measure	Type
14. Vulnerable Patients Safeguarded	a. Patients are screened for safeguarding concerns at presentation	Process
	b. Those at risk referred to appropriate agencies	Clinical
Notes: <ul style="list-style-type: none"> <li>• Burn injuries often occur within vulnerable patient groups living in stressed or socially disadvantaged situations.</li> <li>• Children who suffer more neglect, abuse and welfare concerns than matched controls, are at higher risk of burns [33,34].</li> <li>• Elder abuse has been linked to poverty, functional disability and cognitive impairment [35].</li> </ul>		
15. Minimal Unplanned ITU Re-admissions	Unplanned re-admissions to critical care within 48 hours of discharge from level B1 or above are recorded and audited.	Clinical
Notes: <ul style="list-style-type: none"> <li>• Patient discharge should be planned correctly in order to avoid the necessity for re-admission.</li> <li>• Planned re-admissions for staged or delayed surgery are excluded from this measure.</li> <li>• Unplanned ICU readmission is associated with higher hospital mortality [36].</li> <li>• The incidence of unplanned re-admission to critical care within 48 hours of discharge in the UK is <math>\leq 2\%</math> (median 1.8% ICNARC CMP* data 2012/13) [37].</li> <li>• Re-admission is associated with increased hospital stay, increased consumption of resources and increased morbidity and mortality [38].</li> </ul> <p>*ICNARC CMP – Intensive care national audit and research centre case mix programme</p>		
16. Minimal Complication Rate	Number of in-patients acquiring a blood-borne multi-drug resistant (MDR) infection	Clinical
Notes: <ul style="list-style-type: none"> <li>• MDR organisms include MRSA, VRE and CPE.</li> <li>• Numerous articles demonstrate the detrimental effects of individual MDR organisms in a burn setting and the benefits of specific antibiotics.</li> <li>• See [39-41].</li> </ul>		
17. Maintenance of Pre-injury BMI	No greater than 10% loss in body mass at discharge for adults. 0% for children	Clinical
Notes: <ul style="list-style-type: none"> <li>• It is recognised that body mass in children will increase during a long admission and that major limb amputations will affect body mass calculation [42].</li> </ul>		

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## Appendix 1. Tools Recommended For Use In Assessing and Evaluating Functional Recovery Following Burn Injury

Specificity	Paediatric	Adult
<b>Health Related Quality Of Life</b>		
Burn Specific	Burns Outcomes Questionnaire (age 5-18) Health Outcomes Burns Questionnaire (age < 5)	Burns Specific Health Scale – Brief (BSHS-B) Satisfaction with Appearance Scale
Non-Burns Specific	Paediatric Inventory of Quality of Life (PedsQL) Age 2-4: Family Impact Module, Parent Rept for Toddlers Age 5-7: Family Impact Module, Parent Rept for Young Children Age 8-12: Family Impact Module, Parent Rept for Children, Child Rept Age 13-18: Family Impact Module, Parent Rept for Teens, Teenager Rept	Euro-QoI – 5 Dimensions (EQ-5D-5L) Short Form – 36 (SF-36)
<b>Impairment</b>		
Non-Burns Specific	No validated measure	Dynamometer Goniometer Kapandji Index
<b>Functional Status</b>		
Burns Specific	No validated measure	Functional Assessment for Burns (FAB)
Non-Burns Specific	No validated measure	Chelsea Critical Care Physical Assessment Tool (CPAx) Functional Independence Measure (FIM) Quick Disabilities of the Arm, Shoulder and Hand (Quick-DASH) Timed Up and Go
<b>Scarring</b>		
Subjective Assessments	Matching Assessment of Photographs and Scars (MAPS) Patient & Observer Scar Assessment Scale (POSAS) (age ≥12) Vancouver Burn Scar Scale (VBSS/ VSS) Modified Vancouver Burn Scar Scale (mVSS)	Matching Assessment of Photographs and Scars (MAPS) Patient and Observer Scar Assessment Scale (POSAS) Vancouver Burn Scar Scale (VBSS/ VSS) Modified Vancouver Burn Scar Scale (mVSS)
Objective Assessments	Dermalab Combo	Tissue tonometer Dermalab Combo

Appendix 2. Tools Recommended For Use in Assessing and Evaluating Psychological Well-Being Following Burn Injury

Age / Symptom Group	Recommended Time Points for Administration			
	Wound Healing	6 Monthly	Scar Maturation	Annually
Quality of Life (pre-school children)			PedsQL Family Impact Module. PedsQL Parent Report -Toddlers (2-4)	
Quality of Life (Age 5-7)			PedsQL Family Impact Module. PedsQL Parent Report for Young Children (5-7)	
Quality of Life (Age 8-17)			PedsQL Family Impact Module. PedsQL Parent Report (8-12) PedsQL Family Impact Module PedsQL Parent Report (13-16) PedsQL Child Report – Teenager (13-18)	
Quality of Life (Age ≥18)			BSHS-Brief	
Post-Traumatic Stress Symptoms (Age 8-16)			CRIES-8	
Satisfaction with Appearance (Age 8 -16)			Satisfaction with Appearance Scale	

**Assessment Time Points**

Wound Healing  
6 Monthly  
Scar Maturation  
Annually

The point at which the patient no longer requires dressings  
Every 6 months from the point of Wound Healing  
The point of discharge from the scar management service  
12 monthly from the point of scar maturation while the patient remains under care