British Burn Association

Outcome Measures for Adult and Paediatric Services

1. Introduction

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 team of 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.

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Pre-admission

Desired Outcome	Outcome Measure	Rationale & Notes	Data Collection
1. Accurate Burn Assessment			
a. Burn Area	Difference between first area assessment and Burn Service area assessment.	Accurate assessment of burn size in the Emergency Department is an important aspect of initial care as it determines whether transfer to a specialist burns service is required and determines initial fluid resuscitation (Freiburg et al 2007).	On IBID
b. Vulnerable patient groups identified	Assessment of safeguarding concerns recorded in referral.	Burn injuries often occur within vulnerable patient groups living in stressed or socially disadvantaged situations. It is known that children who suffer neglect, abuse and welfare concerns than matched controls are at higher risk of burns (James-Ellison, et al 2009, Greenbaum et al 2006)	Not currently recorded on IBID. Recommended for inclusion in future.
c. Appropriate referral according to NNBC guidelines	Referrals (or discussions about referral) comply with National Threshold Guidance.	The NNBC National Burn Care Referral Guidance has been developed by an expert multi-disciplinary group and the 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). Clinical consensus suggests that prompt access to specialised burn centres for patients with complex or severe injuries is linked to improved outcomes. Nationally consistent referral guidance supports equity of access to specialised burn care services.(Sheridan et al 1999, Latenser 2009, Yurt et al 2009, Praiss et al 2009, NBCR 2001)	Collectable from IBID.
2. Prompt Referral & Transfer			
	a. Time to referral (time from first assessment to referral). b. Time for transfer (time from referral to first burn service assessment or admission).	Prompt transfer to an appropriate service for ongoing care is well recognised as a factor in good outcome and is the basis of the National Burn Care review (Palmer & Sutherland 1987, Barrett & Herndon 2003).	Not currently recorded on IBID. Recommended for inclusion in future.

3. Appropriate Management at the Referring Hospital			
a. Appropriate analgesia offered	i. Pain score recorded using an appropriate tool	Pain scores are the most effective method of assessing pain.	Not currently recorded on IBID. Recommended for inclusion in future.
	ii. Analgesia offered or administered within 1 hour of presentation	Pain management should be early and effective to improve compliance with treatment and psychological outcomes (Stoddard, Martyn & Sheridan 1997).	
b. Fluid resuscitation initiated if indicated	If > 10% TBSA in children or >15% TBSA in adults, fluid therapy started within 1 hour of presentation	Early fluid resuscitation improves outcomes in severely burned children (Barrow & Jesche 2000) and adults (Chrysopoulo et al. 1999).	Not currently recorded on IBID. Recommended for inclusion in future.

Acute Inpatient Care
Non Fluid Resuscitated Burns <10%TBSA in Children, <15%TBSA in Adults. Admitted for > 24hours

Desired Outcome	Outcome Measure	Rationale & Notes	Data Collection
1. Adequate Analgesia			
	a. Pain assessed daily using an appropriate tool	Regular pain assessment should result in analgesia being offered. It would be difficult to collect data on what is given. (Richardson & Mustard 2009).	Not currently recorded on IBID. Recommended for inclusion in future.
	b. Pain assessed at each potentially painful intervention or dressing change.		
2. Prompt Wound Care			
	Burn wound cleaned and dressed within 6hrs of admission	Burn injury removes the epidermal barrier to microbial ingress and leads to evaporative heat loss. Early wound cleaning and application of a dressing controls bacterial colonisation and provides a moist environment for wound healing (Bessey 2007).	Not currently recorded on IBID. Recommended for inclusion in future.
3. Effective Clinical Management			
	Examined by a Consultant Surgeon or Nurse Consultant within 12hrs of admission.	The consensus view of the committee is that this sets a sensible and professional standard.	Not currently recorded on IBID. Time reviewed by burns consultant recommended for inclusion in future.

4. Timely Wound Healing			
	a. Out of therapeutic dressings within 21 days if treated conservatively or 31 days if treated surgically.	Timely healing has been shown to reduce hypertrophic scarring, shorten hospital stay, reduce the need for reconstructive procedures and reduce overall costs. It also hastens return to work and reduces mortality (Deitch et al1983, Engrav et al 1983).	Date 100% healed is recorded on IBID.
	b. Donor sites healed and out of therapeutic dressings within 21 days	Delay in donor site healing prolongs the need for dressings and delays return to work. Delayed healing may be a marker of poor technique, wound healing complications, infection or poor nutrition.	Date of donor site healing is not included in IBID. Recommended for inclusion in future.

Acute Inpatient Care
Fluid Resuscitated Burns >10% TBSA in Children, >15% TBSA in Adults

Desired Outcome	Outcome Measure	Rationale & Notes	Data Collection
1. Adequate Analgesia			
	a. Pain assessed daily using an appropriate tool	Regular pain assessment should result in analgesia being offered. It would be difficult to collect data on what is given. (Richardson & Mustard 2009). Inadequate analgesia delays effective rehabilitation. In future, patient experience could be measured.	Not currently recorded on IBID. Recommended for inclusion in future.
	b. Pain assessed at each potentially painful intervention or dressing change		
2. Optimal IV Fluid Resuscitation			
	a. Unable to define	There is not enough published evidence of the best resuscitation fluid formula for burns, so this should be recorded as a proportion of the burn services recommended regimen delivered. The committee acknowledges that clinical factors may dictate alterations in fluid regimes.	Not currently recorded on IBID. Recommended for inclusion in future
	b. Evidence of over-resuscitation	Serum Na+ outside normal range within the period of formal fluid resuscitation.	Collected on IBID, but date of onset required. Recommended for inclusion in future
	c. Absence of pre-renal failure in resuscitation period	Pre-renal failure defined as a negative change of >30ml/min/1.73m^2 of eGFR within 72hrs of admission (adults)	Not recorded on IBID. Recommended for inclusion in future.

Prompt Wound Care			
	Burn wound cleaned and dressed within 6hrs of admission	Burn injury removes the epidermal barrier to microbial ingress and leads to evaporative heat loss. Early wound cleansing and application of a dressing controls bacterial colonisation and provides a moist environment for wound healing (Bessey 2007).	Not currently recorded on IBID. Recommended for inclusion in future.
3. Effective Surgical Management			
a. Injury Assessment	Patient examined by a Consultant Burns Specialist within 12 hours of admission.	The consensus of the committee was that a patient with a burn injury requiring fluid resuscitation should not wait >12hrs to be assessed by a burn specialist.	Time seen by Burn specialist not currently recorded on IBID. Recommended for inclusion in future.
b. Decompression	Prompt escharotomy when indicated	Escharotomy should be carried out within 3 hrs of being deemed necessary (Orgill & Piccolo, 2009).	Time from decision to treat to procedure not currently recorded on IBID. Recommended for inclusion in future.
c. Surgical Excision	Complete excision of full thickness burn within 5 days of injury	Early excision described as 24hrs to 7 days in literature. The consensus of the committee was that within 5 days was reasonable.	Time from presentation to excision of full-thickness burn not currently recorded on IBID. Recommended for inclusion in future.
4. Prompt Treatment of Respiratory Complications			
	Patients screened for respiratory morbidity within 24hrs and referred to a respiratory physiotherapist if appropriate.	National Standards of Physiotherapy and Occupational Therapy Practice in the Management of Burn injured Adults and Children (2005). 'Respiratory assessment is to be conducted if indicated to determine the immediate treatment needs of a burns patient, within 24 hours of admission to a burns service'.	Not currently recorded in IBID. Recommended that in future the following be included: 1. Screened (by nurse) for respiratory complication 2. Referred to respiratory therapist if appropriate 3. Received treatment by respiratory therapist
5. Timely Wound Healing			
	95% of burn wound healed or no therapeutic dressing required within 2 days per 1% burn or within 31 days, whichever is the longer	Timely healing has been shown to reduce hypertrophic scarring, shorten hospital stay, reduce the need for reconstructive procedures and reduce overall costs as well as improve mortality and return to work (Deitch et al1983, Engrav Heimbach et al 1983). Donor sites are excluded as these are often cropped on more than one occasion	Recorded in IBID.

6. Adequate Enteral Nutrition			
	a. Enteral nutrition started within 6 hours of admission for burns ≥ 20% TBSA (unless contra-indicated)	Evidence of benefit only for started within 24 h of burn injury (Mosier at al 2011)	Enteral nutrition start time is recorded in IBID
	b. Burns ≥ 20% TBSA assessed by a dietician using a MUST tool within 1 day of admission	Both adult and paediatric MUST tools are available	Time first seen by dietician is not currently recorded in IBID Recommended for inclusion in the future
	c. Weekly nutritional assessment throughout stay by dietician		Not currently recorded in IBID. Recommended for inclusion in the future

Rehabilitation

Desired Outcome	Outcome Measure	Rationale & Notes	Data Collection
1. Optimal functional outcome			
	a. All patients screened for functional morbidity within 72hrs of admission and referred for intervention if appropriate	National Standards of Physiotherapy and Occupational Therapy Practice in the Management of Burn injured Adults and Children (2005). 'An assessment should be carried out and documented within one working day of admission into Burns service.	Not currently recorded in IBID. Recommendation that the following be included in future: 1. Screened for functional morbidity within 72 hrs 2. Referred for assessment and treatment
	b. Functional morbidity improved by intervention	AusTOMS score +/- modified FIM recorded for those patients that receive an intervention. The AusTOMS outcome measure was selected as it is used internationally as a global outcome measure (Perry et al 2004, Unsworth 2005, Unsworth et al 2004) which measures change over time (Unsworth & Duncombe 2004 & 2005). Inter-rater reliability studies have also been performed in physiotherapy and occupational therapy (Morris 2005). The FIM was chosen as it has been shown to be a predictor of discharge home versus another setting (Farrell & Trantowski et al 2006). A modified version has been developed at St. Andrews Burns Centre (Smailes, Englesman & Dziewulski 2012).	Recorded in IBID.

2. Optimal psychosocial well-being			
	a. Patients admitted for > 24 hours are screened for psychosocial morbidity prior to discharge.	Early psychosocial screening identifies those patients who are vulnerable to developing psychological problems post-injury, so that interventions can be targeted proactively (Blakeney, Rosenberg, Rosenberg & Faber 2008).	Psychosocial screening recorded in IBID.
	b. All inpatients and outpatients are screened for psychosocial morbidity at 6 months post discharge using agreed measures (or at point of discharge from the burns service if sooner). Those with scores within the clinical range are referred for psychosocial intervention. The scoring will be carried out by an individual who has had a minimum tier 2 training.	At 6 months post-discharge, it is expected that most patients will have returned to their pre-injury activities (e.g. school/work). Most will not have been discharged from the burns service. It also avoids the 12 month anniversary of the injury which can be a low point for many patients. The National Burn Care Group Psycho-social Working Party Supplement to the Report (March 2006) recommended a tiered approach to psychosocial burn care. Burn care professionals working at tier 2 and above would have expertise that equips them to screen for psychological distress. Psychosocial outcome measures have been discussed and agreed by the BBA Psychosocial Special Interest Group – see table 1 below for recommended measures (Gaskell, Hodgetts, Mason, & Cadogan, 2008) Psychosocial Screening and Outcome Measures for Paediatric Burns Services. BBA Psychosocial Special Interest Group Report, March 2011.	Recorded in IBID.
3. Optimal Scar Outcome in terms of Appearance, Function and Symptoms.			
	a. All patients are assessed for risk of developing problem scars at 6 weeks post healing, or at point of discharge from the service and referred for treatment if appropriate.	The Patient and Observer Scar Assessment Scale offers a suitable, reliable and complete scar evaluation tool for burn scars (Richard & Brayza et al 2009, Lienke & Draaijers et al 2004).	Not currently recorded in IBID. Recommended that the following be included in future: 1. Screened for development of problem scarring 2. Referred for treatment if required Fields to be included in IBID for POSAS scores at both commencement and 6 months after cessation of therapy
	b. The impact of intervention is assessed using POSAS at start, 6 months post-healing and end of treatment		

Global

Desired Outcome	Outcome Measure	Rationale & Notes	Data Collection
1. Optimal Survival			
	Survival rate within predicted norms using ABSI and Belgian burn scores	See Roberts et al (2012)	Data for these calculations is currently included in IBID
2. Minimal Rate of Unplanned Readmissions			
	Unplanned re-admission rate within 30 days: a) for surgery b) for other reasons	Patient discharge should be planned correctly in order to avoid the necessity for re-admission. Planned re-admissions for staged or delayed surgery are excluded from this measure.	Date for readmission is currently recorded in IBID, but the reasons for readmission are not. Recommended for inclusion in the future.
3. Minimal Rate of Unplanned ITU Readmissions			
	Unplanned ITU readmission rate	Unplanned readmission to ICU is associated with higher hospital mortality (Rosenberg & Watts, 2000).	Date for readmission is currently recorded in IBID, but the reasons for readmission are not. Recommended for inclusion in the future.
4. Minimal Complication Rate			
	a. Incidence of positive blood cultures during admission	See Brusselaers et al (2010), Shupp et al (2010).	On IBID
	b. Incidence of MRSA, VRE and Multiresistant Acinetobacter	Numerous articles demonstrate the detrimental effects of individual multi-drug resistant (MDR) organisms in a Burn unit setting or the benefits of specific antibiotics e.g. Klebsiella – Bennett et al (2010), Colistin – Ganapathy et al (2010), Military experience– Keen et al (2010) The group also discussed catheter related infection and ventilator related pneumonia but did not include these in this first draft.	On IBID
5. Maintain Pre-injury Body Mass			
	Percentage loss or gain in weight during admission	The committee recognizes that body mass in children will increase during a long admission and that major limb amputations will also affect body mass calculation (Lee, Benjamin & Herndon 2005)	% weight loss or gain from admission to discharge where amputations have not occurred and admission time is <3/12 on IBID

Table 1: Psychosocial Outcome Measures to be Completed at 6 months Post-discharge

Patient Group	Outcome Measure	Reference
Parents of children (up to age 18)	PedsQL Parent Report for Toddlers (age 2-4) OR PedsQL Parent Report for Young Children (age 5-7) OR PedsQL Parent Report for Children (age 8-12) OR PedsQL Parent Report for Teens (age 13-18) AND PedsQL Family Impact Module	Varni, Burwinkle, Seid & Skarr (2003)
Children aged 8-18 years	PedsQL Child Report: Child (age 8-12) OR PedsQL Child Report: Teenager (age 13-18) AND CRIES-8 AND Satisfaction with Appearance Scale (for ages 12 and over)	Varni, Burwinkle, Seid & Skarr (2003) Perrin, Meiser-Stedman & Smith (2005) Lawrence, Heinberg, Roca, Munster, Spence and Fauerbach (1998)
Adults aged 16 years and over	Burns Specific Health Scale-Brief	Kidal, Andersson, Fugl-Meyer et al (2001)

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