Cost of Burn Care in a State Hospital Burn’s Unit

A burn injury sets in motion a cycle of pain, disfigurement and a search for survival
From a fiscal point of view
Maximizing resource utilization means continual evaluation and economic analysis of therapeatic modalities without sacrificing quality of care.

Economics of paediatric burn care
2008 3 papers
Cost $1061/ % burn
Ag dressings $1600/patient: SSD $4100

This the cost for small burns
What about large burns
Health Care in Crises

World wide movement towards health care reforms through rationing and rationalization

Vital collection of data
data dissemination: decision makers, consumers providers of services

Health funding in the past based on consumption many inefficient practices escalating technology expensive

Inefficiency impossible to accept/tolerate
Problems Facing Burn Care

Burns will remain prevalent in RSA
socio-economic status, housing, paraffin
lack of electrification, drug/alcohol abuse

Urban population expansion

Limited Burn Facilities 9 burn units

Extensive work load, lack of dedicated staff

Burn care —expensive service despite low technology

Educational programmes - only a few
Problems Facing Burn Care

- No national incidence by age and injury severity
- Information of facilities not available in RSA
- Protocols lacking for referral, basic treatment
- Deficiency in medical, nursing, Pam’s personal
- Lack of dedicated private facilities
- Shortage of ICU facilities, basic equipment and dedicated theatre time creates suboptimal services
- Under developed peripheral services
- Admission criteria limits access
- No scoring system to strategise burn care
A network of burn injury services

- Non-complex injuries would be treated by Gap's, district nurses, clinics 86%
- For the next level of severity patient would receive treatment at emergency departments residing in Day Hospital, PHC and District Hospitals
- For the next level at Regional Hospitals
- For major burns - care to be provided at regional burn facilities or units
Administration - Fiscal Responsibility

- Introducing case-mix funding on diagnostic related groups
- Burnt patient - complex
- Futility of treatment – cost effectiveness of treating a major burn
- Funding issues may influence referral patterns, treatment
- In burn care – impossible to measure the true cost
Hospital costs associated with Paediatric Burn Injuries

- Modern burn care is resource intensive
- Costs may persist years after the initial injury
- No published estimation in RSA regarding the index hospitalization or long term care costs

- USA 8% TBSA, LOS 8 days = $9000
  32% TBSA, 17% grafted, LOS 42 days, $69,000

RSA  AN   94%   Hi      R43.000  2002
AK    65%      Med aid      R179.000  2002
S S   85%      Ho          R 0.00  2007
## Burns Unit Main Cost Drivers
10 months 861 patients 2009

<table>
<thead>
<tr>
<th>Entity</th>
<th>Finances ,Rands</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal</td>
<td>3,393,000.00</td>
<td>66.4</td>
</tr>
<tr>
<td>Dressings</td>
<td>708,330.00</td>
<td>13.9</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>367,984.00</td>
<td>7.2</td>
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<tr>
<td>Lab</td>
<td>348,582.00</td>
<td>6.8</td>
</tr>
<tr>
<td>Blood</td>
<td>206,480</td>
<td>4.0</td>
</tr>
<tr>
<td>Feeding</td>
<td>89,195.00</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>5,113,571.00</strong></td>
<td><strong>R5939/ Patient</strong></td>
</tr>
</tbody>
</table>
# Numbers of burn injuries according to consumer product

<table>
<thead>
<tr>
<th>Consumer products</th>
<th>Number of injuries</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchen related items (incl. appliances)</td>
<td>550 000</td>
<td>32</td>
</tr>
<tr>
<td>Household electrical appliances (not kitchen)</td>
<td>360 000</td>
<td>20</td>
</tr>
<tr>
<td>Bath water related</td>
<td>250 000</td>
<td>14</td>
</tr>
<tr>
<td>Chemicals &amp; cleaners</td>
<td>160 000</td>
<td>9</td>
</tr>
<tr>
<td>Fuels &amp; fuel burning equipment</td>
<td>120 000</td>
<td>7</td>
</tr>
<tr>
<td>Heaters &amp; furnaces</td>
<td>110 000</td>
<td>6</td>
</tr>
<tr>
<td>Fireworks</td>
<td>80 000</td>
<td>5</td>
</tr>
<tr>
<td>Electrical wiring equipment</td>
<td>70 000</td>
<td>4</td>
</tr>
<tr>
<td>Toys &amp; sport-related equipment</td>
<td>40 000</td>
<td>2</td>
</tr>
<tr>
<td>Linens &amp; clothing</td>
<td>20 000</td>
<td>1</td>
</tr>
</tbody>
</table>

D'Souza AL. Pediatrics. 2009
### Breakdown of Burn Care Cost Drivers

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean cost</th>
<th>Percentage of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ward</td>
<td>R27 013</td>
<td>34%</td>
</tr>
<tr>
<td>Theatre</td>
<td>R37 947</td>
<td>48%</td>
</tr>
<tr>
<td>Medicine</td>
<td>R2 050</td>
<td>3%</td>
</tr>
<tr>
<td>Blood replacement products</td>
<td>R1056</td>
<td>1%</td>
</tr>
<tr>
<td>Laboratory investigations</td>
<td>R2418</td>
<td>3%</td>
</tr>
<tr>
<td>Dressings</td>
<td>R8831</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>R79052</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Cost structure

Acute phase

45% 3 yr hot water R270 000
42% 2 yr fire burn R208 000
21% 3 yr fire burn R64 000

Rehabilitation 10 – 15 years

Australian Adult Burn $ 250 000 hospital treatment

Additional cost incurred by rehabilitation, time off work and loss of earning capacity
Cost Drivers

21 children  mean age 3.9 years ± 2.9
TBSA  18.5% ( 2-90%)
      19%  DPT to Full thickness
Cause:  hw 66.6%, fire 23.8%, others 9.6%
Los  15.7 ± 31.8 days

Individual cost  R3764

Most heal spontaneously
Long hospital stay
Underestimated costs
Reducing costs, maintaining quality

Reduce LOS: Ambulatory care
change in-patients to out-patients treatment
use long acting antiseptics

Consider day-case surgery
ASA 1-2, small non-infected burns
home circumstances

Enhance wound healing

Use advance technology
expedite surgery, improve outcome
Reducing costs, maintaining quality

Reduce LOS: Ambulatory care

change in-patients to out-patients treatment
use long acting antiseptics

Consider day-case surgery
ASA 1-2, small non infected burns
home circumstances

Enhance wound healing

Use advance technology
expedite surgery, nutrition
Ambulatory burn care

- Early hospital discharge
- Regular return daily to less frequent
- Remove dressings
- Hydro-therapy
- Physical activity
- Wound assessment
- Topical therapy
- Analgesic/ angiolytics

Ambulatory therapy < 71%
LOS > 53%
Infection > 40%
Cost > 45%

RP Foglia JPS 2004
Reducing costs, maintaining quality

Reduce LOS
change in-patients to out-patients treatment

**use long acting antiseptics**

Consider day-case surgery
ASA 1-2, small non-infected burns
home circumstances

Enhance wound healing

Use advance technology
expedite surgery, improve outcome
Key Benefits for Wound Care

Rapid broad spectrum bactericidal activity
Ease of application
Suitable for small and large burns
Ameliorate the wound inflammatory process
Enhance re-epithelialization time and reduce the need for skin grafting and debriding procedures
Low toxicity level
Reduce length of hospital stay
Acticoat - 25% Hot Water Burn

Healed at 3 weeks
2% grafted
LOS 4 days
3% grafted
Nanocrystalline Silver vs Standard Treatment

• Assumptions:
  – NCS changed every 3 days in theatre
  – SBT would require daily changes
  – SBT: LOS 38% longer (1)
  – SBT: 1/3 of dressing changes in theatre

• Costs:
  – Theatre: 2009 Western Cape UPFS
  – Ward: 2009 Western Cape UPFS
  – Supplies: Western Cape 2009 tender prices

(1) Fong J, Wood F, Fowler B. A silver coated dressing reduces the incidence of early burn wound cellulitis and associated costs of inpatient treatment:
# Nanocrystalline Silver vs Sulphadiazine 1% on Jelonet

<table>
<thead>
<tr>
<th>Case</th>
<th>Composite Cost NS*</th>
<th>Composite Cost SBT**</th>
<th>Cost saving (Rand)</th>
<th>Cost factor multiple (SBT vs. NS)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>R 97,404.96</td>
<td>R 172,288.34</td>
<td>R 74,883.38</td>
<td>1.77</td>
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<tr>
<td>2</td>
<td>R 79,131.88</td>
<td>R 90,441.41</td>
<td>R 11,309.53</td>
<td>1.14</td>
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<tr>
<td>3</td>
<td>R 45,196.08</td>
<td>R 48,362.78</td>
<td>R 3,166.70</td>
<td>1.07</td>
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<tr>
<td>4</td>
<td>R 111,532.70</td>
<td>R 130,270.71</td>
<td>R 18,738.01</td>
<td>1.17</td>
</tr>
<tr>
<td>Mean</td>
<td>R 83,316.41</td>
<td>R 110,340.81</td>
<td>R 27,024.41</td>
<td>1.32</td>
</tr>
</tbody>
</table>

* Nanocrystalline Silver  ** Sulphadiazine 1% cream on Jelonet carrier

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**Table 3: Nanocrystalline Silver Dressings versus Sulphadiazine 1% on Jelonet**

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**Table 4: Nanocrystalline Silver Dressings versus Povidone Iodine 5% cream on Jelonet carrier**
Reducing costs, maintaining quality

Reduce LOS: Ambulatory care
  change in-patients to out-patients treatment
  use long acting antiseptics

Consider day-case surgery
  ASA 1-2, small non infected burns
  home circumstances

Enhance wound healing

Use advance technology
  expedite surgery, improve outcome
Day/Outpatient Management

- Less than 10% TBSA
- Ability to take in oral fluids
- No serious facial burns
- No airway burns or aspiration of hot liquids
- No abuse
- Dependable family
- Available transport
Minor Burns suitable for Day-case Surgery

Partial thickness burns < 10 % TBSA
Full thickness burn<5% TBSA
No co-morbidity

86% burns treated in this manner
Acceptable results
Ambulatory Surgery
Reducing costs, maintaining quality

Reduce LOS: Ambulatory care
change in-patients to out-patients treatment
use long acting antiseptics

Consider day-case surgery
ASA 1-2, small non-infected burns
home circumstances

Enhance wound healing

Use advanced technology
expedite surgery, improve outcome
Biobrane

- Biobrane- biosynthetic dressing
- Protects and closes wounds
- Provides bacteriologic barrier, prevents fluid and protein loss, reduces pain, allows for undisturbed healing
- Stored at room temperature, shelf life 3 years
Biobrane / AgSD

Hypothesis: decreased pain, healing time, LOS

>24 hrs PTB scald or flame burns
AgSD 2x/daily until wounds were healed
Biobrane applied 1x only

<table>
<thead>
<tr>
<th></th>
<th>AgSD</th>
<th>Biobrane</th>
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<tbody>
<tr>
<td>Los</td>
<td>3.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Time to heal</td>
<td>16</td>
<td>9.7</td>
</tr>
<tr>
<td>Pain meds</td>
<td>1.9</td>
<td>0.5</td>
</tr>
<tr>
<td>Infection</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Treatment with biobrane is superior than flamazine

D N Herndon 2000
Biobrane

Partial thickness
HWB
VBSS = O
80% TBSA fire burn
Inhalation injury
LOS 1 day/burn

Biobrane
Reducing costs, maintaining quality

Reduce LOS: Ambulatory care
  change in-patients to out-patients treatment
  use long acting antiseptics

Consider day-case surgery
  ASA 1-2, small non-infected burns
  home circumstances

Enhance wound healing

Use advanced technology
  expedite surgery, improve outcome
Deep partial to full thickness burns

Early excision, prompt wound closure
Improve survival, decrease LOS
Fewer metabolic and septic complications
Decrease expenditure
Increase survival, improved functional and cosmetic results
Versajet Hydro-surgery

Power console
Control the cutting, debriding and aspiration effects with settings 1-10 and by angulating the hand piece.

Hand piece
Pressurized saline is forced across the operating window causing a localized Venturi effect into which tissue is held, cut and removed.

To reduce costs hand piece re-sterilized.
Versajet- water jet debridement

Remove devitalized, necrotic, infected tissue in small increments and preserves tissue

Preserves more dermis than conventional tangential techniques

Reduces bacterial burden
Reducing costs, maintaining quality

Reduce LOS: Ambulatory care
  change in-patients to out-patients treatment
  use long acting antiseptics

Consider day-case surgery
  ASA 1-2, small non-infected burns
  home circumstances

Enhance wound healing

Use advance technology Nutrition
  expedite surgery, improve outcome
The ravaging effects of a severe burn “Burn illness”

- Hypermetabolic / catabolic state
- Loss of muscle and bone mass
- Prolonged inactivity
- Physical limitations
- Fatigue
- Stunted linear growth
- Psychosocial displacement

85% TBSA
Nutritional Support

Injury - Trauma  
- Sepsis  
- Burns

Stress Hormone Release

Hypermetabolic Response

Catabolism

Multi-organ Failure

Death

Enteral feeding

Metabolic response: low level anabolic response

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<th>F</th>
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<tbody>
<tr>
<td>Cortisol</td>
<td></td>
<td></td>
<td>N</td>
<td>N</td>
<td></td>
<td>Non-significant</td>
</tr>
<tr>
<td>Glucagon</td>
<td></td>
<td></td>
<td>↑</td>
<td>↑</td>
<td></td>
<td>Non-significant</td>
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<tr>
<td>Insulin</td>
<td></td>
<td></td>
<td>↑</td>
<td>↑</td>
<td></td>
<td>Anabolic response</td>
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<tr>
<td>I/g</td>
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<td>↑</td>
<td>↓</td>
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<td>Anabolic response</td>
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<tr>
<td>GH</td>
<td></td>
<td></td>
<td>↑</td>
<td>↓</td>
<td></td>
<td>Anabolic response</td>
</tr>
</tbody>
</table>
Nutritional support
Reducing costs, maintaining quality

Reduce LOS: Ambulatory care
    - change in-patients to out-patients treatment
    - use long acting antiseptics

Consider day-case surgery
    - ASA 1-2, small non-infected burns
    - home circumstances

Enhance wound healing

Use advance technology
    Rehabilitation
    expedite surgery, improve outcome
A life changing event, Disfigured, scarred

Needs a new life map, Years of rehabilitation

Ostracized from society Needs stable environment
Rehabilitation

• “Do the right thing the first time”

• Physio and occupational therapy introduce on day one
Cost Cutting Measures

Ambulatory care
Antiseptics
Day surgery
Fiscal responsibility “financial units”
monthly financial statements
identification of 10 main cost drivers
hospitalization, dressings, blood, complications (sepsis) etc
In our quest for fiscal responsibility and quality assurance we must not forget about the individual patient
Street wise

“Kaizen”

“Continuous improvement “– empower those closest to the coal face of activity, so that they can participate in improving it and allowing them to spread the information through-out the system