A SEVEN-YEAR EPIDEMIOLOGY STUDY OF 12,381
ADMITTED BURN PATIENTS IN TAIWAN
--USING THE INTERNET REGISTRATION SYSTEM OF THE
CHILDHOOD BURN FOUNDATION--

Kwang-Yi Tung, MD                  Mei-Lin Chen, GCBHS
Hsian-Jenn Wang, MD                  Ging-Song Chen, MSW
Michael Peck*, MD, ScD                Charles Chih-Ho Liu, MD, MS**

Childhood Burn Foundation, Taipei, Taiwan, ROC
University of North Carolina at Chapel Hill, USA*
Division of Plastic Surgery, Cathay General Hospital, Taipei, Taiwan, ROC **
Purposes of the Study

- To provide an overview of the basic epidemiological characteristics of these admitted burn patients from the year of 1997 to 2003.

- To emphasize the trend of changes in these years.

- To focus on the data of children burn.

- To evaluate the outcome and try to weight the risk factors.
Childhood Burn Foundation of the Republic of China

The Childhood Burn Foundation was co-founded by Mackay Memorial Hospital and Ali Shan Oasis Shrine Club of Taipei, the Republic of China in 1988.

The main services of CBF:

1. Medical financial assistances
2. Dissemination and public education of burn prevention
3. Physical and psychological rehabilitation and re-entry programs
4. Improving medical care standards
   ➢ Epidemiology study
Childhood Burn Foundation of the Republic of China

- 22.5 million people
- 36,000 km²
  - 1/3 flatland
  - 2/3 mountain area
- 34 contract hospitals when the study began in 1997
- Increased to 43 hospitals at present
  - 33 burn centers + burn wards
  - 10 burn wards

Kwang-Yi Tung
THE INTERNET REGISTRATION SYSTEM

Central Server of Childhood Burn Foundation
Functions:
- Data Processing
- Data Transmission
- Automatic display

Chinese Burn Association, Taiwan, ROC

The Delphi Interface/ web of a local node in contract hospitals

Internet OLAP editions

Kwang-Yi Tung
Material and Methods

12,381 admitted burn patients from 43 hospitals

SPSS, version 10.0, for analysis
12,381 Admitted Patients

- Burn Center: 45.4%
- Burn Ward: 40.3%
- Surgical ICU: <18y/o (not shown)
- Surgical Ward: >=18y/o (not shown)

Kwang-Yi Tung
Results

- There were 8,172 males and 4,206 females, with a male to female ratio of 1.94 to 1.
- No change in sex ratio in these years. ($X^2=42.000, \ p>.05$)
Age Distribution

- Average age: 29.3 years
- Age between 1 and 3 years old was the peak of incidence.
- 33.4% of all patients were under 18 years old.
- 26.4% of all patients were children under 7 years old.
Age Distribution and Causes of Burn Injuries

- Scald Burn
- Flame Burn
- Chemical Burn
- Electrical Burn
- Contact Burn
- Others

Kwang-Yi Tung
The mean size of burn wound was 14.0% of total body surface area.

950 patients (7.7%) suffering from a burn size > 40% TBSA.
Burn Extent

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>17.17%</td>
<td>14.54%</td>
<td>14.91%</td>
<td>14.99%</td>
<td>13.41%</td>
<td>11.45%</td>
<td>12.38%</td>
</tr>
<tr>
<td>Median</td>
<td>11.00%</td>
<td>10.00%</td>
<td>10.00%</td>
<td>10.00%</td>
<td>8.00%</td>
<td>7.00%</td>
<td>7.00%</td>
</tr>
<tr>
<td>Case No. &gt; 40% TBSA</td>
<td>120</td>
<td>207</td>
<td>164</td>
<td>148</td>
<td>96</td>
<td>103</td>
<td>111</td>
</tr>
</tbody>
</table>

Severity of burn Injury decreased in these years
- Significant difference in Means of burn extent (t=19.728, p<.000)
- Significant difference in Medians of burn extent (t=14.582, p<.000)
- Case number with burn extent >40% TBSA decreased.
  \( (x^2=29.529, p<.000) \)
CAUSE OF BURN

<table>
<thead>
<tr>
<th>Type of Burn</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flame Burn</td>
<td>32.5%</td>
</tr>
<tr>
<td>Scald Burn</td>
<td>43.2%</td>
</tr>
<tr>
<td>Chemical Burn</td>
<td>6.6%</td>
</tr>
<tr>
<td>Electrical Burn</td>
<td>5.6%</td>
</tr>
<tr>
<td>Contact Burn</td>
<td>11.2%</td>
</tr>
<tr>
<td>Others</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

Causes of burn remained not significantly changed in these 7 years. ($X^2=39.083, p>.05$)

1. Hot drinking water 17.9%
2. Hot soup and drinks 14.7%
3. Explosive gases 4.2%
4. Ignition by gasoline 3.2%
5. Hot bathing water 3.1%
Cause of Burn in Children Patients (3,825 cases)

1. Hot drinking water 33.7%
2. Hot soup and drinks 27.2%
3. Hot bathing water 5.4%
4. Hot food 3.3%
5. Hot tap water 2.2%

Scald Burn 76.8%
Flame Burn 14.1%
Chemical Burn 2.4%
Electrical Burn 1.2%
Contact Burn 5.6%
Others 0.6%
The vast majority of injuries (53.3%) occurred in dwelling place.

18.6% of the patients were burn in working place.
In children group, 79.2% of cases occurred in dwelling place.

Living room and kitchen.
Activity during the burn injuries

- Domestic: 31.8%
- Recreational: 29.2%
- Occupation: 32.1%
- Unpaid labor: 8.9%
- Religious: 1.2%
- Sporting: 0.6%
- Military: 0.5%
- Unknown: 2.8%
- Others: 5.5%

Children Burn Group

Kwang-Yi Tung
38.0% in July to Oct.
Least in Feb.
Most in July.
($x^2=118.215, p<.000$)
Hourly Distribution

- All cases
- Scald burn
- Flame burn

Kwang-Yi Tung

Childhood Burn Foundation of The Republic of China
Length of Stay

- Mean = 16.44 days in all cases (1.18 day/%TBSA)
- Mean = 16.41 days in survival cases (1.31 day/%TBSA)
**OUTCOME**

**Mortality Rate**

- The overall mortality rate is 381 out of 12,381 patients (3.1%).
- 272 patients (71.4%) from flame burn, 55 (14.4%) from scald burn.
- 38 patients (10.0%) were under 18 years old.
- The LA$_{50}$ was around 80% TBSA.
**OUTCOME**

Burn Extent and Mortality

<table>
<thead>
<tr>
<th></th>
<th>Death</th>
<th>Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burn extent $\geq$ 40% TBSA</td>
<td>277</td>
<td>673</td>
</tr>
<tr>
<td>Burn extent $&lt;$ 40% TBSA</td>
<td>104</td>
<td>11327</td>
</tr>
</tbody>
</table>

Odds ratio $= 44.828 \ (X^2=2346.580, \ p<.000)$

29.2% of the burn patients $>$ 40% TBSA can not survive.
**OUTCOME**

Mortality Rate and Inhalation Injury

![Graph showing mortality rate with and without inhalation injury.](image)
Associated Inhalation Injury

**Absence**
- 90.8%

**Presence**
- 9.2%

**Inhalation Injury in flame burn cases**

<table>
<thead>
<tr>
<th>Inhalation Injury in flame burn cases</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>219</td>
<td>667</td>
</tr>
<tr>
<td>No</td>
<td>53</td>
<td>2800</td>
</tr>
</tbody>
</table>

Odds Ratio = 17.346 ($x^2 = 523.752$, $p < .001$)

Mortality rate: 24.7%

Kwang-Yi Tung
**OUTCOME**

Mortality and Age Groups

\(X^2 = 131.195, p < .000\)

Kwang-Yi Tung
**OUTCOME**

Mortality and Sex Distribution

<table>
<thead>
<tr>
<th>Death</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>274</td>
<td>7901</td>
</tr>
<tr>
<td>Female</td>
<td>107</td>
<td>4099</td>
</tr>
</tbody>
</table>

Odds Ratio = 0.753 (\(x^2=6.074, \ p=0.14\))

Kwang-Yi Tung
OUTCOME

Mortality and Suicide Attempts

- 2.4% (300 cases) of all burn patients
  - Male: 199
  - Female: 101
- Mean total body surface area burn of 40.7%
- Mortality rate: 29.3%
  - Male: 32.2%
  - Female: 23.8%

<table>
<thead>
<tr>
<th>Suicide attempt</th>
<th>Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>88</td>
</tr>
<tr>
<td>No</td>
<td>293</td>
</tr>
</tbody>
</table>

Odds ratio=16.700 \( (\chi^2=710.620, \ p<.000) \)
Five Steps of First Aid of Cooling

1. Flush
2. Remove
3. Soak for 30 minutes
4. Cover
5. Send

Only 4.1% of all burn cases could actually perform the full 5-step first aid.

Kwang-Yi Tung
### OUTCOME

**Length of Stay and Adequate First Aid**

<table>
<thead>
<tr>
<th>Percentage TBSA</th>
<th>Cooling with water&lt;30 min.</th>
<th>Cooling with water&gt;30 min.</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0~10% TBSA</td>
<td>11 days</td>
<td>10.33 days</td>
<td>49.274</td>
<td>&lt;.000</td>
</tr>
<tr>
<td>11~20% TBSA</td>
<td>17.06 days</td>
<td>14.71 days</td>
<td>21.210</td>
<td>&lt;.005</td>
</tr>
<tr>
<td>21~30% TBSA</td>
<td>26.31 days</td>
<td>23.63 days</td>
<td>28.794</td>
<td>&lt;.005</td>
</tr>
</tbody>
</table>
Summary

This descriptive study shows the epidemiology profiles of 12,318 admitted burn patients in Taiwan. All of the data collection was using an internet online registration system of Childhood Burn Foundation.

In our study, scald was the leading cause of burn injuries, especially for those small children group and most of them were burned at home.
Summary

The overall mortality rate is 3.1%. The severity of burn injury decreased in these 7 years.

Several risk factors, such as associated inhalation injury, burn extent, age and suicide attempt, were correlated to show the significances of difference. The LA$_{50}$ was around 80% TBSA.

In patient group with burn extent less than 30% TBSA, adequate first aid could affect the outcome by shortening the length of stay significantly.
Dear Colleagues,

On behalf of the Chinese Burn Association, we host the 2004 Post ISBI Congress-Taipei Symposium. I bid you “welcome”.

The Chinese Burn Association of Republic of China in Taiwan was founded in 1992. The association was organized to join the international body in sharing knowledge and specialty. The association focus on boosting knowledge, research support, and affording the training program for our colleagues in order to catch the current state-of-the-art. Our association was organized from 25 burn centers in Taiwan, and in addition, the Childhood Burn Foundation of the Republic of China in Taiwan and Sunrise Foundation supplied the resources for burn prevention, medical care, research, re-entry of burn victim, burn camping and rehabilitation.

As in any international body, we need to share ideas and experiences with our old friends. In order to compensate those colleagues in South East Asia and Taiwan unable to attend 2004 ISBI Yokohama meeting, we are organizing post congress meeting and invite special guest to talk interesting lectures. Also, we are cordially inviting you all to see Taiwan burn facilities include burn camping.

We’re looking very much forward to see you in Taipei. We can predict that meeting will be an outstanding success. Thanks to the uniring efforts of the Burn teams and the great supports from International Society for Burn Injuries.

Best wishes
Sincerely,

Hsian-Jenn Wang, MD, MMM
President
2004 Post ISBI Congress-Taipei Symposium

Organized by:
Chinese Burn Association
in Taiwan
Co-organized by:
Childhood Burn Foundation
in Taiwan
Supported by:
International Society for Burn
Plastic Surgical Association in Taiwan
Sunrise Foundation of Social Welfare

Secretariat Office
c/o K & A International Co., Ltd.
P.O. Box 55-1143, Taipei, Taiwan
Tel: +886-2-2593-5279
Fax: +886-2-2591-9345
E-mail: info@2004tpeburns.org.tw

Kwang-Yi Tung