International Outreach Program, American Burn Association (ABA), Children’s
Burn Foundation (CBF) Aug 8 - Aug 26, 2011
St. Francis Hospital, Katete, Zambia, Aug 8 - Aug 26, 2011
Team members: Nathan Kemalyan, MD\textsuperscript{1}; Tamra Graham, RN\textsuperscript{1}; Helen Christians, MOT\textsuperscript{1};
Katie Hollowed, RN\textsuperscript{2}; Maggie Dylewski, PhD, RD\textsuperscript{3}
Oregon Burn Center\textsuperscript{1}
Washington Burn Center\textsuperscript{2}
Shriners Hospitals for Children – Boston\textsuperscript{3}

Background

St. Francis Hospital (SFH) in Katete is a 360-bed district mission hospital in the Eastern Province of Zambia. The immediate service area has a population of 250,000. Although there is a district hospital in Chipata, SFH functions as the primary district hospital for the Eastern Province and provides primary and secondary medical care to a geographical area with a population of 1.4 million. The surgical wards admit ~80 burn patients annually. Burns are typically seasonal and occur primarily due to cooking (scalds) and/or open fires in the home (flame). Burns of > 20\% total body surface area (TBSA) are life threatening. Scald burns related to cooking and flame burns due to open fires are the primary cause of burns. In winter (June-August), the incidence of burns increases due to open fires used for warmth. Burns in patients with epilepsy are usually deep with a significant TBSA. Zambians will not help a seizing victim who falls into the fire because of the belief that epileptics are possessed by demons or evil spirits. Significant delays in seeking medical treatment are common. Patients often turn to the African bush doctor for treatment that may include tattoos, herbal remedies, prayers, or spells.

SFH is sponsored by the Anglican and Catholic dioceses of eastern Zambia. The hospital hosts a two-year nursing college. There are many medical volunteer opportunities within the hospitals programs. The hospital trains licentiate students and licentiate interns. A licentiate is a clinical officer with credentials limited to use in Zambia only. They receive a 2-year training program, followed by a 1-year internship. The licentiate students rotate 4 months on the surgical service at St. Francis Hospital. The hospital has fully trained Licentiates and licentiate interns as well.

The Executive Director, Shelagh Parkinson, MD, and the hospital administrator, Ian Parkinson, have been at SFH since 1998. They will be leaving SFH in November 2011 and a new management team has yet to be identified. Matthew Mwale, the Assistant Director, is a Zambian native who will provide continuity for the transition in administration. He has been identified as highly qualified to perform the functions of executive director, but has not been seen with favor by the local diocesan leaders because he is not Anglican. The diocesan hospital board is advertising for an administrator with a business administration degree and 5 years of experience in hospital administration.

The chief surgeon is Mike Currie, MD, who has been at SFH since November 2009. Dr. Curry is departing in October of 2011, and will be replaced by a short-term surgeon for 6 weeks, followed by a Dutch surgeon who has committed to stay for 2-3 years.

Mrs. Seya, RN, director of nursing services, is on leave for 6 months. Mrs. Xoliswa Silanda, chief nursing tutor, has been at SFH at least 16 yrs. Mr. Rodwell Banda, senior anesthetist, has been at SFH since 1988. He officially retired in 2010, but has continued
on a 3-year contract to continue delivering anesthesia services at SFH.

In June 2009, the Zambian Ministry of Health was accused of fraud, resulting in an immediate cessation of flow in international funds for health care in Zambia. This severely constrained the hospital’s budget, which receives funds from the government as well as support from NGOs in Europe that are channeled through the ministry of health. St. Francis is a member of the Church Hospitals Association of Zambia (CHAZ), who provide a variety of support and education services to member hospital, including access to warehousing of materials and pharmaceutical supplies that may not be available through the governmental channels. CHAZ serves as a channel for WHO and UN funds for public health improvement projects within Zambia. CHAZ was one of the few Zambian organizations that manage donated funds within the health care sector that sustained a clean audit in the wake of the scandal in the Ministry of Health.

Program Goals

The primary long-term goal for the International Outreach Program at St. Francis Hospital is to globally improve burn care, reduce mortality and morbidity, and progressively move towards a more independently functioning burn service (see Figure 1).

Over the next 3-5 years, the program will provide burns education, teaching sustainable, translatable burn care that will prepare the SFH medical staff and improve the functional outcomes of burns of 10-24% TBSA.

The other primary goal is to expand burn prevention outreach programs to decrease the incidence of burn injury and death through educational programs in the schools & community businesses in Katete, and provide support to the Fire Brigade Service in Katete.

A third goal that is in exploratory stages is the launching a national effort at burn injury prevention and centralized burn care in partnership with CHAZ and member hospitals.

Table 5 contains detailed goals and timetables.

The August 2011 ABA burn outreach team:

Kathleen Hollowed, RN; Washington Hospital Center burn center, Washington DC
Maggie Dylewski, RD, PhD; Shriners Hospital for Burned Children, Boston MA
Nathan Kemalyan, MD; Oregon Burn Center, Portland OR
Helen Christians; MOT, Oregon Burn Center, Portland, OR
Tamra Graham, RN; Oregon Burn Center, Portland OR
<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Date of Burn</th>
<th>Date of Arrival</th>
<th>Burn size</th>
<th>Mechanism &amp; Location of Injury</th>
<th>Dates of Operating Theatre</th>
<th>Therapy Interventions</th>
<th>D/C Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mukasa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sl=sloughectomy STSG=grafting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N.M.</td>
<td>3</td>
<td>7/1/11</td>
<td>7/11/11</td>
<td>10%</td>
<td>Scald; full thickness wounds on back; Partial thickness wounds healing.</td>
<td>STSG: Prior to our arrival</td>
<td>PM activity Photo</td>
<td>8/9/11</td>
</tr>
<tr>
<td>P.P</td>
<td>3</td>
<td>7/23/11</td>
<td>72/11</td>
<td>20</td>
<td>Scald; partial thickness to abdomen, back, bilateral thighs, genitalia</td>
<td>SI: prior to our arrival</td>
<td>PM activity Photo</td>
<td>DC AMA</td>
</tr>
<tr>
<td>I.P</td>
<td>2</td>
<td>8/5/11</td>
<td>8/6/11</td>
<td>5</td>
<td>Flame; bilateral feet and arms</td>
<td></td>
<td>Photo</td>
<td>8/16/11</td>
</tr>
<tr>
<td>F.M.</td>
<td>7</td>
<td>8/3/11</td>
<td></td>
<td>6</td>
<td>Scald; mix of partial and full thickness to right leg and thigh.</td>
<td></td>
<td>Knee ext splint Home exercise Photo PM activity</td>
<td>8/11/11</td>
</tr>
<tr>
<td>M.M.</td>
<td>29</td>
<td>7/19/11</td>
<td>7/26/11</td>
<td>27</td>
<td>Scald; Full thickness to right foot</td>
<td>SI: with amp of toes prior to our arrival 8/12/11: STSG rt foot</td>
<td>Ambulation Home Program Compression Photo PM activity</td>
<td></td>
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<tr>
<td>H.P</td>
<td>2</td>
<td>7/20/11</td>
<td>8/8/11</td>
<td>2</td>
<td>Scald; Full thickness to bilateral hands</td>
<td>8/12/11: STSG to right hand</td>
<td>B hand splints Home Program Drinking from cup PM activity Photo</td>
<td></td>
</tr>
<tr>
<td>D.B.</td>
<td>7</td>
<td>7/16/11</td>
<td>8/1/11</td>
<td>8</td>
<td>Flame; Full thickness to right arm and right leg</td>
<td>8/8/11: STSG to right arm and right leg</td>
<td>Home Program Compression Photo</td>
<td>8/22/11</td>
</tr>
<tr>
<td>A.S.</td>
<td>68</td>
<td>8/4/1</td>
<td>8/4/11</td>
<td>40</td>
<td>Flame; Full thickness to bilateral thighs, chest, abdomen</td>
<td>8/8/11: Excision to fascia on bilateral thighs</td>
<td>Bereavement Photo of daughters with pt and food</td>
<td>8/14/11 (death)</td>
</tr>
<tr>
<td>T.B.</td>
<td>55</td>
<td>7/4/11</td>
<td>8/1/11</td>
<td>5</td>
<td>Scald; rt foot, right lower back and buttock</td>
<td>8/22/11 BKA, autograft buttocks, left posterior thigh</td>
<td>PM activity Photo</td>
<td></td>
</tr>
<tr>
<td>B.B.</td>
<td>4</td>
<td>8/14/11</td>
<td>8/17/11</td>
<td>4</td>
<td>Flame; left elbow</td>
<td>8/23/11 Declined surgery</td>
<td>Home exercise program</td>
<td>8/23/11 AMA</td>
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<tr>
<td>Kizito</td>
<td></td>
<td></td>
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<tr>
<td>C.P.</td>
<td>41</td>
<td>7/26/11</td>
<td>7/29/11</td>
<td>2</td>
<td>Flame; Full thickness to upper left extremity.</td>
<td>8/8/11: SL 8/10/11: SSTG</td>
<td>Home Program Edema control Photo</td>
<td>8/18/11</td>
</tr>
<tr>
<td>S.B.</td>
<td>5</td>
<td>8/3/11</td>
<td>8/3/11</td>
<td>30</td>
<td>Scald; Partial thickness to buttock, torso (all healing)</td>
<td></td>
<td></td>
<td>8/9/11</td>
</tr>
<tr>
<td>M.M.</td>
<td>35</td>
<td>January 2011</td>
<td>7/21/11</td>
<td>2</td>
<td>Flame; Full thickness to right foot. Right foot has osteo</td>
<td>8/22/11 8/9/11 fled hospital to avoid amputation but returned</td>
<td>AROM Compression</td>
<td></td>
</tr>
<tr>
<td>E.B.</td>
<td>40</td>
<td>7/1/11</td>
<td>7/7/11</td>
<td>4</td>
<td>Flame; Full thickness to bilateral feet</td>
<td>8/12/11: SI and SSG bilateral feet</td>
<td>Photo</td>
<td>AMA 8/32/11</td>
</tr>
<tr>
<td>P.B.</td>
<td>30</td>
<td>7/6/11</td>
<td>7/29/11</td>
<td>9</td>
<td>Flame; Full thickness to left leg (tendon exposure)</td>
<td>8/10/11: SSTG</td>
<td>Home Program Compression Photo</td>
<td>8/18/11</td>
</tr>
</tbody>
</table>
Surgical practice at SFH

Daily ward rounds cover 50-70 surgical patients (including the burn patients), and clinic on Tu-Th has 40-50 patients each time. Power outages occur commonly in the evening, but the surgical schedule is generally not affected by power outages. Burn cases made up approximately 25% of the surgical volume during the August 2011 team's visit. Primary excision of burns is not routinely practiced. Serial "sloughectomy" under ketamine is common and wounds are allowed to granulate before consideration of skin grafting.

Skin grafts are harvested with a Padgett dermatome (one currently functional), or Watson knives (at least two are available). The August burn team brought 4 Weck handles, guard sets and approximately 100 blades. Instructions were given and the Zambian surgery team practiced harvesting skin and excising burns with the small blades. The electrocauterity works intermittently. Most skin meshing is performed by hand on a small wooden cutting board. A Brennen 2:1 mesher is available and functional, as well as a Zimmer mesher with an adequate supply of cards (1.5:1 mesh ratio) Blood is available intermittently in the form of packed red cells imported from Singapore. Most patients are anemic from chronic open wounds, malaria, HIV/AIDS and malnutrition.

Excision under tourniquet was introduced by the June team and this practice was reinforced with the August team. Pre-treatment of donor-site surfaces and granulation tissue with topical epinephrine saline was demonstrated, and application of topical adrenaline/saline to excised surfaces and harvested donor sites was emphasized. Adrenaline is readily available in small unit doses. The June and August teams emphasized tangential excision of hypertrophic granulation tissue to improve skin graft take rates. The patients treated while we were there experienced 90-100% graft take. The August team also demonstrated fascial excision as an alternative to serial sloughectomy as a means to rapidly achieve a granable wound with controlled blood loss. Tangential excision of larger burns will not be accepted in an environment constrained by limited blood supply, limited supply of dressings and limited experience in assessing burn depth and adequacy of excision. Skin graft fixation is problematic, as staples are in short supply, suturing is costly of precious OR time and suture material. Overlap and taping was demonstrated, as was overlapping and wrapping grafts in place with multilayer dressings. Intra-operative plaster splinting for protection of grafted joints, as well as functional positioning of the hand was demonstrated.

Delayed donor site healing occurs due to imprecise skin graft harvest with hand-blades, as well as lack of donor-site hygiene. Burn teams emphasized wound care for donor sites with delayed healing using daily wound hygiene and topical antibiotic therapy. Delayed presentation of extremity burns with bone exposure and osteomyelitis results in a need for many amputations. Prosthetic limbs are readily available for patients in need of below-knee amputation for unsalvageable foot burns.

Education Activities of the August 2011 Burn Team
<table>
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<tbody>
<tr>
<td><strong>Lecturer</strong></td>
<td>Kemalyan</td>
<td>Dylewski</td>
<td>Kemalyan</td>
<td>Hollowed</td>
<td>Hollowed, Dylewski</td>
<td>Katie H.</td>
<td>Kemalyan</td>
<td>Kemalyan</td>
<td>Kemalyan</td>
<td>Christians</td>
</tr>
<tr>
<td><strong>Contact hours</strong></td>
<td>1.25</td>
<td>0.75</td>
<td>0.25</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0.75</td>
<td>1</td>
<td>1.25</td>
<td>2</td>
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<tr>
<td><strong>Topic</strong></td>
<td>Intro to Burn Care</td>
<td>Nutrition and Burn Care</td>
<td>Presentation techniques</td>
<td>Post-op Wound Care</td>
<td>Burn care</td>
<td>Burn patient admission</td>
<td>Burn admission and postoperative orders</td>
<td>Diagnosis of surgical conditions in the abdomen</td>
<td>Burn Care Primer, Admission orders, Lower extremity physical diagnosis</td>
<td>Exercise &amp; Positioning</td>
</tr>
<tr>
<td><strong>Audience</strong></td>
<td>Licentiates SFH</td>
<td>Licentiates SFH</td>
<td>Licentiates SFH</td>
<td>Licentiates SFH</td>
<td>Tuesday morning meeting</td>
<td>Licentiates</td>
<td>Licentiates</td>
<td>Licentiates</td>
<td>Physio</td>
<td></td>
</tr>
<tr>
<td><strong>Number of participants</strong></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>45</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>
Nursing staff

Patients with burn injuries are admitted to Mukasa (female and pediatric ward) and Kizito (male ward). Our time was split between the female and male wards. We assisted in bathing, wound assessments, dressing changes, staff education, and burn team collaboration in surgical wards rounding.

Three nurses work the day shift, two nurses work the afternoon shift, and one nurse works the overnight shift. As the June 2011 team observed, nurse staffing remains a barrier to quality wound care. A nursing staff member is present for all dressing changes in both Mukasa and Kizito.

Wound Care: There was a significant improvement in wound care provided since the June 2011 Burn team visit. Upon arrival, we observed that cleaning and dressing of burns and wounds was done daily in the morning. Soap was provided to all patients and available for hand washing at all sinks. Wounds are washed daily with soap and water. We noted that nurses change gloves between patients.

Our observations are as follows:

Wound Care Observation #1: Nurses could not identify the correct topical ointment to apply on various stages of burn wounds.

Wound Care Intervention #1: Katie Hollowed and Tamra Graham educated the nursing staff on stages of wound healing as it relates to various topical ointments.

Pain/Anxiety Management: Paracetamol and ibuprofen are provided before dressing changes on both burn wards. The Licentiates write a scheduled order for these medications. We observed that patients were pre-medicated before dressing changes.

Pain/Anxiety Management Observation #1: Despite the use of Paracetamol and ibuprofen, dressing changes continued to appear uncomfortable for the patient. The cause of the discomfort (pain vs. anxiety) is difficult to assess.

Pain/Anxiety Management Intervention #1: A discussion was held with nursing staff regarding uses of distraction techniques such as coloring, playing with play dough, or simply allowing the child or adult remove the dressing themselves to give them a sense of control.

Pain/Anxiety Management Observation #2: Medication orders are not being renewed by doctors or licentiates. When orders expire, medication is not given. Nursing staff does not appear to be empowered to advocate for continued access to analgesics for their patients This observation is consistent with the finding from the June 2011 team.

Pain/Anxiety Management Intervention #2: Preprinted admission and post-operative orders can address the issue re-ordering medications to an extent.
Nutrition

Grace is the nutritionist who started at SFH on August 4, 2010. She earned a diploma in Nutrition, which requires 2 years of classes and 1 year of clinical rotations. Grace plans to return to school next year to earn a degree in Nutrition. She was also selected for a 1-month work exchange program, which requires her to go to Texas next April.

Frederick is a 3rd year nutrition student. He will earn his diploma next year and he is the first Nutrition student to train at SFH since Grace was hired last year. Grace does not know if or when more students will arrive.

Currently Grace and Frederick spend most of their time attending to malnourished patients in the pediatric ward, educating diabetics in the clinic, and teaching at the nursing school.

Protein-energy malnutrition is quite common among children under the age of five. This is a vulnerable stage of the lifecycle because children are weaning off breast milk and relying on solid foods for nourishment. Patients admitted to the malnutrition ward receive F75 or F100 formula and are monitored closely for weight loss/gain, pedal edema, vomiting, diarrhea, and appetite. Maggie Dylewski attended malnutrition rounds with Grace and Frederick on 8/12/11, 8/15/11, and 8/16/11. She assisted in the assessment of 15 malnourished children.

Although Grace expressed comprehension regarding the importance of nutrition and wound healing, she did not routinely evaluate or monitor the burn patients. Maggie Dylewski provided one-on-one education to both Grace and Frederick on the importance of nutrition and burn injuries. Grace attended Tuesday morning meeting on 8/16/11 for the burn care lecture given by Katie Hollowed and Maggie Dylewski. During the lecture, Grace was introduced to the surgical team. Subsequently, Grace attended burn rounds and began her involvement in burn care. Her newly added duties will include:

1.) Ensuring that burn patients are receiving the appropriate supplements
2.) Educating patients and families on high protein diets for wound healing
3.) Communicating with the medical team regarding the nutritional status and needs of the burn patients.

This will be done via oral and written communication. Grace and/or the Nutrition student will document in the medical record at least 3 days/week.

Grace accepted her new role with pleasure and expressed a high interest in assuming a role in burn care. She demonstrated intelligence, motivation, and teamwork. We suspect that she will be able to sustain her participation in burn care throughout her tenure at SFH.

Meals

During the August 2009 trip, the patients at SFH were only fed two hospital meals per day. Meat was never available, and beans were only provided once a week. Since then, the food service has significantly improved. All patients now receive three meals per day (7am, 1pm, and 4:30pm). The morning meal continues to include porridge with groundnuts. The afternoon meal consists of nshima, cabbage, and a protein source...
(beans, capenta (fish), or beef). In the evening, the patients receive another round of nshima and cabbage.

**Supplements**

As the June 2011 team indicated, Plumpy Nut remains unavailable. Plumpy Nut is a peanut butter-like supplement that contains 545 kcal and 13.6 g of protein per package. It is well received by all patients and is thus a fabulous adjunct to the nutritional therapy of burn patients.

The shortage of Plumpy Nut was discussed amongst the medical staff on 8/16/11 at the Tuesday morning meeting. Grace reported that UNICEF might have temporarily ceased shipments due to incomplete documentation of Plumpy Nut utilization. Per UNICEF guidelines for the use of Plumpy Nut, Grace must document who receives Plumpy Nut. The primary recipient of Plumpy Nut should be malnourished children, but may also be used for other patients at risk for malnutrition (burns). Recently the documentation has been incomplete due to inappropriate uses of Plumpy Nut, including staff consumption. Grace will continue to educate the staff on the appropriate use of Plumpy Nut.

The continuous availability of F100 is promising. F100 is a milk-based formula that contains 1 kcal/mL, 30g/L protein, and a vitamin/mineral supplement. If shipments of WHO supplied F100 are unavailable, the hospital makes their own F100 formula. The recipe includes sustainable ingredients:

- Milk
- Sugar
- Oil
- Water
- CMV (vitamin/mineral powder)

The pharmacy begins the preparation by combining the powdered milk and sugar. This mixture is then sent to the formula preparation room (FPR) in the pediatric ward where the remaining ingredients are added. Each burn ward must order and retrieve the F100 daily. Specifically, an invoice with patient names and amount of F100 requested is presented to the FPR each morning. Mid-morning a nurse from each burn ward must go to the FPR and collect the F100. Throughout the August 2011 trip, all burn patients (children and adults) received and consumed F100 at least once a day. We were told by the nursing staff that patients like the F100 and often request it.

**Posters**

We discovered that the Plumpy Nut and F100 posters that were hung during the August 2009 trip remained on the walls of both burn wards. The Plumpy Nut poster, which was translated into the local tribal dialect, encourages patients to ask for Plumpy Nut because it will help heal their wounds. The F100 poster displays the proper amount of F100 that each burn patient should receive and is thus is utilized as tool for physicians, medical students, and licentiates. Fresh, laminated posters were brought and replaced the previous posters.

**Nutrition Education**

Maggie Dylewski worked with Grace and/or Frederick daily. She explained overall burn care and provided education on the importance of nutrition and burn injuries. Both
Grace and Frederick attended burn rounds and visualized wound care. They were taught how to nutritionally assess a burn patient and educate the family on optimal nutrition.

Nursing knowledge of nutrition and burns was assessed using a short survey. The questions and answers are listed in Table 3. Nine nurses on Kizito and Mukasa completed the survey. Overall, the nurses expressed good knowledge. Five (56%) nurses correctly associated F100 with wound healing. Most nurses (88%) knew that protein was important for burn patients and could identify foods that were good for burn patients. The most concerning result that 3 nurses considered Nshima a good food source for burn patients, and only 1 nurse identified F100 as a food that helps with wound healing.

Throughout our visit, all team members reinforced nutrition education with the nursing staff. The head nurses attended the burn lecture during the Tuesday morning meeting, where appropriate nutrition for burn patients was discussed in detail.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answers</th>
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</table>
| Why is F100 given to burn patients? | Wound healing (n = 5)  
It contains protein (n = 2)  
For nutritional purpose Peaks immunity |
| What nutrients found in food are important for burn patients? | Protein (n = 8)  
Vitamins (n = 5)  
Fat (n = 2)  
Carbohydrate (n = 2) |
| What foods will help burn patients heal their wounds? | Beans (n = 5)  
Vegetables (n = 5)  
Meat (n = 5)  
Fruits (n = 4)  
Milk (n = 4)  
Fish (n = 4)  
Egg (n = 3)  
Nshima (n = 3)  
Groundnuts (n = 2)  
F100  
Fluids  
Rice |
Pharmacy

Each ward, Kizito and Mukasa, are responsible for ordering their own floor stock of medications, which are stored in their corresponding drug rooms. Supplies are ordered on Thursday morning and delivered in the evening. The order is based on the number of patients that require the medications. If the stock of medication runs out before the Thursday ordering process, it is the responsibility of the nursing staff to request the necessary medications.

The pharmacy requests their supplies every month. The supplies are routinely delivered the first week of each month, but may or may not reflect the most recent order request. Thus, the hospital is often out of Silver Sulfadiazine, and other important medications. Presently, the pharmacy has 173 tubes of Silver Sulfadiazine in 15gram tubes and 330 tubes of expired Neomycin, which is still being used on patients. Folic Acid, Iron, and Plumpy Nut were also out of stock during our visit.

Physiotherapy Observations

Lenard Banda is the senior physiotherapist posted at St Francis. He has been on a paid educational leave of absence for over 12 months. He is participating in an advanced physiotherapy certificate program in Lusaka and returns to Eastern Province between terms to work at St Frances Hospital for a few days as well as Chipata Hospital and other area clinics as directed by Zambian government. He plans to be in training for one more year.

Muape Mutale is the junior physiotherapist and has been posted at St Francis for nearly 2 years. Except for Leonard's infrequent visits, she is the lone physiotherapist at this 360 bed regional hospital. Her responsibilities include in-patient and outpatient therapy for orthopedic, CP and clubfoot patients. She rounds in Mukasa and Kizito surgical wards that include the burn treatment areas every Tuesday and Thursday with surgical team and receives treatment orders at that time. She has very limited contact with burn patients and never is involved when burn patients return to clinic post discharge. Muape works very closely with orthopedic surgeon who flies or drives to St Francis from Lusaka one or two times a month. She is present during the entire orthopedic clinic that often includes over 100 patients. On August 18, she was present at 13 orthopedic surgeries completed by the visiting orthopedic surgeon. She continues to follow all orthopedic patients post surgery and at out patient clinics. Muape's normal work schedule was Monday through Friday 0800 to 1630 hrs and there was no therapy coverage on weekends.

The Physiotherapist Office is a large well equipped room that includes parallel bars, a full length mirror, several mat tables including one with adjustable height, a working hydroculator with numerous hot packs, several large inflated therapy balls, weights of various sizes, a shoulder mobility wheel, an arm ladder, a working iontophoresis machine and colorful toys. The room was organized and inviting.

Interactions

Team Occupational Therapist accompanied Muape on Tuesday and Thursday surgical rounds including both the men's and women's burn units. All burn wounds were observed and therapy plan developed for burn patients concerning ambulation and range of motion exercises. As patients with below-knee grafts prepared for discharge home, team OT and Muape trained patients to apply crape wrap (ace wrap) or tubigrip
stockings for toe to knee compression. St Francis did have boxes of G, F, E and D tubigrip in pharmacy that is commonly used in USA instead of ace wraps for compression. Nursing staff uses crape wrap (ace wrap) as outer dressing and cuts wraps off rather than unwrapping. Patients and patient's families were trained to remove crape wraps and wash with soap and water.

Physiotherapists in Zambia are not trained in splinting and St Francis does not have any splinting material. Surgeons use plaster-casting material to immobilize joints post grafting. Neither Muape nor Leonard had ever casted a burn patients but they were both proficient in serial casting for orthopedic patients. The burn team did bring a small sample of low temperature splinting material and worked with Muape to construct a knee extension splint for a 7 yr. old girl and with Leonard to construct bilateral hand splints for a 2 yr. old girl. Andrew Musonda, an orthotist who accompanied the traveling orthopedic surgeon, also actively participated in hand splint construction.

Team OT brought a small HP photosmart A516 photo printer. Team members were able to print patient and family photos and issue photos to patients within a few hours. All patients or parents of patients requested a photo of the actual injury along with a group family photo. The family photo usually included food or a family member feeding the patient. Families explained to team that they wanted to prove that they had taken good care of the patient. Families appeared to truly appreciate having a photo to document this traumatic event. In discussion with St Francis staff, they explained that Zambian children and adults with easily noticeable disfiguring burn injuries are often isolated in the community. Burn scar contractures that limit long term functional abilities such as walking, lifting and carrying significantly interfere with a patients ability to become productive member of their community.

Burn team did organize several afternoon activities using supplies they furnished. These activities included play dough, bubbles, coloring books/crayons, beading, friendship bracelet weaving, soft Frisbee toss, toddlers manipulating large beads on a string and simple games of catch. The women were much more receptive to these activities than men. Patients and their family members were encouraged to participate. There was a close bond between the families in the burn units and they enjoyed doing an activity together and continued the activity after burn team members had left the unit.

As time allowed, burn team OT did work with Muape in other hospital wards. This included treatments with Regina and Catherine, both paraplegics due to spinal TB. Muape was concerned about planter flexion contractures of the ankle with prolonged bedrest. A simple ankle dorsiflexion positioning system was devised using a wide cardboard box supported by the foot of bed. Two folded tanges (common cloth supplied by family) were placed at patient's posterior calves to float heels and minimize risk of pressure sores. Within 24hrs, patients were able to direct positioning of legs with ankles dorsiflexed at 90 degrees. Both patients were taken to physiotherapy department to work on sitting balance. St Francis workshop was able to fabricate, sand and varnish sliding boards for wheelchair transfers as designed by burn team OT. Both women were able to use sliding boards for safe transfers from bed to wheelchair with minimal assist rather than direct lift transfers to chair. Wheelchairs are available for St Francis patients at discharge and take about 1 month to secure.

**Nursing Student Education**
Tamara Graham visited the nursing school to speak with the head nursing instructor. She noted that the first-year students had just begun their training in July 2011 and would not comprehend the material that would be presented. She also stated that the second-year students received the burn lectures from the June 2011 burn team and did not see a benefit from another presentation.

**Burn Prevention Education**

The burn team, including Katie Hollowed, Maggie Dylewski, Tamra Graham, and Helen Christians, provided a burn prevention lecture at Tikondane Community School. Participants included 65 parents whose children were enrolled in the school. During the June 2011 trip, these children received burn prevention education and materials. Topics covered in the lecture to the parents included:

- Mechanisms of burn injuries
- Fire safety
- Extinguishing a flame burn (stop, drop, roll)
- Preventing scald burns
- Candle safety
- Treatment options

A stop, drop and roll demonstration was done by Katie Hollowed and one parent volunteer. Parents appeared engaged in the lecture, expressed comprehension, and asked many appropriate questions. A 15 question post-test was verbally administered to the entire audience. Responses were given by raising hands. Questions and responses can be found in attachment 1. Briefly, 13 parents (20%) reported receiving previous burn prevention education. Most parents correctly identified how to extinguish fires on clothing, where matches should be stored, and the need to keep candles away from children.

<table>
<thead>
<tr>
<th>Table 4: Detailed Goals &amp; Objectives with Timetable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
</tr>
<tr>
<td>Build 6 bed burns wards on Mukasa and Kizito</td>
</tr>
<tr>
<td>Acquire initial epidemiological burn data</td>
</tr>
<tr>
<td>Assess early impact of multidisciplinary burn teaching teams</td>
</tr>
<tr>
<td><strong>Time Frame</strong></td>
</tr>
<tr>
<td>2008</td>
</tr>
<tr>
<td>2002-2009</td>
</tr>
<tr>
<td>2007-2009</td>
</tr>
<tr>
<td><strong>Status</strong></td>
</tr>
<tr>
<td>Complete</td>
</tr>
<tr>
<td>Complete</td>
</tr>
<tr>
<td>Published Jan 2011</td>
</tr>
<tr>
<td><strong>Project Description</strong></td>
</tr>
<tr>
<td>6 bed burn wards with heaters, sinks, hydrotherapy, and mosquito nets</td>
</tr>
<tr>
<td>IRB/SFH Director approved study. Published January 2011. Peak incidence ages 2-5 yrs. Mortality rate &gt;50% for burns &gt;20% TBSA. No impact on outcomes with teaching teams.</td>
</tr>
<tr>
<td>Completed burn diagrams and analgesic use ↑, p=0.05. Trends in antimicrobial use, early</td>
</tr>
<tr>
<td><strong>In charge</strong></td>
</tr>
<tr>
<td>SFH administration</td>
</tr>
<tr>
<td>Latenser</td>
</tr>
<tr>
<td>Task</td>
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<tr>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Assess ongoing impact of multidisciplinary burn teaching teams</td>
</tr>
</tbody>
</table>
| Correctly calculate and perform fluid resuscitation when appropriate  | 2009-present | On going | -Posters in Kizito and Mukasa developed by August 2009 team. Updated by 2011 Aug team.  
-Didactic, direct patient care, and lab experience for RN's, nursing students, and licentiates  
-Preprinted orders by Aug 2011 team.                                                                                                                                 | ABA/CBF teams       |
| Correctly complete burn diagram on all admitted burn patients        | 2007-preset | On going | 50% completion 2007-2009. Reassess June 2012.                                                                                                                                                                | ABA/CBF teams through IRB/SFH Director approved study |
| Reduce morbidity for all admitted burns                               | 2007-preset | On going | Correct wound size and depth evaluation on admission, topical antimicrobials, appropriate pain medication, early consult with Physio, splinting and positioning, early excision & grafting when appropriate.  
-Reassess in June 2012.                                                                                                                                 | SFH burn care team/administration |
| Reduce mortality rate for all admitted burns                          | 2007-preset | On going | Appropriate resuscitation, topical antimicrobials, nutritional supplementation when appropriate, use of blood transfusions where appropriate, early excision and grafting.  
-Reassess in June 2012.                                                                                                                                 | SFH burn care team/administration |
| Improve knowledge of wound care/infection control                    | 2007-preset | On going | -Daily dressing changes with antimicrobials.  
-Daily linen change for every patient.  
-Disinfect shower between patients.                                                                                                                                                                           | SFH burn care team/administration |
-Reassess in June 2012.                                                                                                                                                                                   | SFH team |
| Perform appropriate pain                                             | 2007-preset | Jan 2011 publication showed increase in Medical staff writes and nurses administer pain | SFH team |

-Excision and grafting, and use of fluid resuscitation.
<table>
<thead>
<tr>
<th>Description</th>
<th>Start Date</th>
<th>Status</th>
<th>Proposed Action</th>
<th>Responsible Parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain management</td>
<td></td>
<td></td>
<td>Analgesic use but 10% of patients never received pain medications.</td>
<td></td>
</tr>
<tr>
<td>Prevent post-burn contractures</td>
<td>August 2011</td>
<td>On going</td>
<td>- Preprinted order sheets Aug 2011 team.</td>
<td>SFH/ABA/CFB teams</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Reassess in June 2012.</td>
<td></td>
</tr>
<tr>
<td>Prevent post-burn contractures</td>
<td></td>
<td></td>
<td>- Positioning posters made by the 2009 team have disappeared.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- New positioning and exercise poster developed by 2011 OT were hung on walls in both units.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- OT educated current physiotherapist on splint making techniques using available resources.</td>
<td></td>
</tr>
<tr>
<td>Improve knowledge of nutritional requirements in burn patients</td>
<td>2007-present</td>
<td>On going</td>
<td>- Monitor availability of Plumpy Nut and F100.</td>
<td>SFH administration/</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Nutritionist at SFH follows burn patients</td>
<td>ABA/CFB Teams</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Appropriate nutritional supplements in pre printed orders.</td>
<td></td>
</tr>
<tr>
<td>Improve hand hygiene practices by hospital staff and visitors</td>
<td>2007-present</td>
<td>On going</td>
<td>- Soap available at each sink in the burn center. Encourage staff to use them.</td>
<td>SFH medical/nursing administration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Post signs about hand hygiene in Kizito and Mukasa near each sink.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Provide individual bottles of hand sanitizer to all SFH staff.</td>
<td></td>
</tr>
<tr>
<td>Dedicated long-term attending surgeon presence</td>
<td>2007-present</td>
<td>On going</td>
<td>Mike Currie here through Nov 2011. Another surgeon arriving for up to 3 years.</td>
<td>SFH administration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mike Currie may return long term in 2012.</td>
<td></td>
</tr>
<tr>
<td>Two dedicated Zambian burn nurses</td>
<td>June 2011</td>
<td>Pending</td>
<td>Assess practicality of having one burn nurse in charge of each of the burns units. Top up provided by CBF.</td>
<td>SFH and CBF administration</td>
</tr>
<tr>
<td>Educational module for nurses working in Mukasa and Kizito</td>
<td>June 2011</td>
<td>Pending</td>
<td>Nurses working in Mukasa and Kizito have opportunity to attend 2-week lecture course on burns as provided to nursing students.</td>
<td>SFH nursing administration/ABA/CFB teaching teams</td>
</tr>
<tr>
<td>Improved availability of essential burn care</td>
<td>June 2011</td>
<td>Pending</td>
<td>Weekly inventory of stock in OT, Mukasa, and Kizito</td>
<td>SFH administration</td>
</tr>
<tr>
<td>Task</td>
<td>Target Date</td>
<td>Status</td>
<td>Description</td>
<td>Responsible Party</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Supplies to assure that supplies from pharmacy are available in advance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Address psychological impact of burn injury on patients</td>
<td>June 2011</td>
<td>Pending</td>
<td>Assess psychological impact of burn injuries at SFH. Long term goal for psych counseling.</td>
<td>ABA/CBF research team</td>
</tr>
<tr>
<td>Assess continued impact of multidisciplinary teaching teams</td>
<td>June 2012</td>
<td>Pending</td>
<td>Retrospective chart review 2009-2012 by June 2012</td>
<td>ABA/CBF research team</td>
</tr>
<tr>
<td>Compile minimal database set for burns consistent with WHO</td>
<td>August 2011</td>
<td>Pending</td>
<td>The dedicated burn nurses would perform this job on a monthly basis and submit data to Zambia site director from ABA/CBF.</td>
<td>SFH dedicated burn nurses/ ABA/CBF teams</td>
</tr>
<tr>
<td>Burn care manual for low income countries</td>
<td>June 2011</td>
<td>Pending</td>
<td>Printed manual available for all areas where internet access is not readily available. Goal is printed burn manual for low-income countries by Jan 2012.</td>
<td>Latenser/Maier/Jallo-Knorrek/Logsetty/Dylewski</td>
</tr>
<tr>
<td>Teach burn prevention to school age students in Katete</td>
<td>June 2011</td>
<td>On going</td>
<td>1st questionnaire &amp; intervention completed June 2011. Submit to 2011 MW burn meeting and 2012 ABA meetings. Reassess knowledge retention in June 2012. Consider puppets for school programs.</td>
<td>Heard/Latenser</td>
</tr>
<tr>
<td>Teach burn prevention to adults in Katete</td>
<td>June 2012</td>
<td>Pending</td>
<td>Ray Reynolds &amp; Steve Knorrek develop &amp; teach program. Develop radio program for broadcast by Aug 2011.</td>
<td>Reynolds/Knorrek/Quinn/Kemalyan</td>
</tr>
<tr>
<td>Assess fire service capabilities in Katete district</td>
<td>June 2012</td>
<td>Pending</td>
<td>Contact made with Katete Fire Brigade June 2011. -Ray Reynolds &amp; Steve Knorrek develop &amp; teach program.</td>
<td>Reynolds/Knorrek</td>
</tr>
<tr>
<td>Enhance fire service capabilities in Katete district</td>
<td>June 2012</td>
<td>Pending</td>
<td>Contact made with Katete Fire Brigade June 2011 by Barbara Latenser. -Ray Reynolds &amp; Steve</td>
<td>Kemalyan/Reynolds/Knorrek</td>
</tr>
</tbody>
</table>
### Develop centralized teaching center for training burn care professionals throughout Zambia

**June 2009**  
On going  
Barbara Latenser, Jason Heard met with Joop Jansen, CHAZ board chair, Karen Sichinga, CHAZ exec director in Lusaka June 2011. Potential sites explored, CHAZ board supports mgmt. of burn hospital & partnership with ABA/CBF.  
**Grant application for developing same- submit Jan 2012.**  
Latenser/Quinn/Dylewski/CBF/ABA/Kemalyan

### Improve burn care at UTH as demonstrated by decreased morbidity and mortality.

**June 2009**  
On going  
Support UTH burn care via single-service approach, enhanced surgical capability, uniform documentation, and education.  
ABA/CBF/UTH

### Assess burn care at UTH 2003-2010

**June 2010**  
On going  
Evaluate available data from UTH monthly surgical audits.  
- Compare pre/post ABA/CBF education programs.  
- Assess impact of burn service director on burn care at UTH since spring 2010.  
Maimbo/Jovic/Latenser/Edwards

### Initiate program for burn prevention in the home

**June 2012**  
On-going  
Explore relationships for bringing clean-stove technology to Katete community  
Kemalyan

### Assess Functional Outcomes of burn survivors

**June 2013**  
On-going  
Establish monthly burn follow-up clinic with surgeon/physiotherapist together in clinic  
2012 Burn Team

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**Summary of observations and recommendations, August 2011**
SFH: The maintenance of continuity in knowledge and clinical practice has been challenging, primarily due to the frequent turnover of nursing and medical staff. The nurses assigned to the care of burn patients are overburdened by other surgical patients and are unable to consistently provide focused hands-on burn care. Physiotherapy staffing, nutritional support and the pharmaceutical support and supply chain are similarly tenuous, making the delivery of a multi-disciplinary approach to burn care very challenging.

**Nursing Care for Burns**

Burn nursing is the axis around which multidisciplinary care should be developed. The quality of surgical care cannot be warranted without skilled nursing care. Nursing care for burn victims could be vastly improved by designating and training selected nurses in burn care and assigning them primarily to the care of burns and wounds. Their duties could extend to all surgical wound management in times of low burn census, but expertise in burn care can translate into an elevation in the wound care practice of all patients admitted to the hospital.

The ABA/CHF partnership could collaborate to sponsor specialty training of selected nurses to the nursing administration of SFH. An understanding that these nurses would subsequently be assigned primarily to burn/wound management should be a prerequisite to undertaking training. A SFH partner within the nursing department will need to be identified in order to determine the feasibility of this objective.

Specialty training should be accompanied by supplemental salary to create an incentive to stay with the program as well as rewarding advanced training and continuing education.

Proposed roles for specialty burn nurses:
1) Performance and oversight of wound care in the burn wards and surgical units
2) Responsibility for appropriate documentation and burn registry data collection to measure the performance of burn care within SFH.
3) Training in public education and community burn prevention for the communities served by SFH

**Surgical Care of Burns**

Burn Care is directed and burn surgical care is delivered by a single staff surgeon. There is adequate surgical volume to support two surgeons at SFH. When the single staff surgeon moves on or retires the standard of burn care defaults to the experience that the next arriving surgeon brings to the hospital. Experience in burn care is not a common feature amongst surgeons trained in the western world. This leads to instability in the deliver of burn care at SFH through the transition between surgeons.

Strategies to sustain and grow burn care capacity at the level of the surgeon can include:

1) A commitment to continue to send expert burn surgeons to train the staff surgeon in surgical management of burns early in his/her tenure at SFH.

2) Development of indigenous capacity within Zambia to set the standard of care and provide in-country training of surgeons.
3) Provision of training materials that will allow the surgeon to self-train in burn surgical techniques.

The August 2011 team has created source documents to assist in maintaining a body of knowledge and conventions in clinical practice through transitions in staff and trainees. These include a pre-printed burn admission order set, a basic primer in burn care for licentiate students, interns and nurses, and a surgical strategies document for the staff surgeon.

Discussions have been opened with CHAZ to explore the possibility of developing a Zambian national burn program that can set the standard of burn care for Zambia.

**Burn Prevention**

Initial efforts have been made to contact and educate children and parents in the immediate vicinity of SFH. These efforts should become part of the recurring activities of future burn-outreach teams that visit SFH. Local interest has been identified in "clean stove", or "safe stove" technology, which can simultaneously reduce open-fire cooking and the burden of respiratory illness and burn injury that results from open fire cooking. Because gathering wood and purchasing charcoal are significant burdens for the average Zambian village family, there is natural incentive to adopt clean-stove technology. The ABA/CBF partnership should further explore the possibility of developing partnerships to bring manufacturing/distribution/sale of clean-stove technology to the communities around SFH. CHAZ may be an organization through which wider dissemination of burn prevention efforts can be promoted. CHAZ represents nearly 150 health facilities, including hospitals, clinics and other providers of health care in Zambia. Many of these member facilities see a similar burden of burn injury within their populations.

**Physiotherapy and Burn Treatment**

1) Using St Francis Hospital orthopedic clinic model in which a physiotherapist is present and actively engaged with in-patients and outpatients, a consistent monthly burn clinic should be established for burn patients following discharge. At these out patient clinic visits, physiotherapist could advance home exercise programs and use serial casting techniques for anti-contracture positioning as they are currently doing for clubbed foot and other orthopedic patients.

2) When next sponsored USA burn team returns, senior physiotherapist, Leonard Banta, strongly recommends that an OT prepare a several day burn specific workshop for Zambian physiotherapists that includes anti-contracture positioning and splinting training. Leonard is willing to help coordinate this workshop through the Zambian government to fund travel expenses for the physiotherapists. He will need at least 6 months to apply for funding. Leonard's contact information is as follows: ljbanda@yahoo.co.uk Leonard Banda, St Francis Hospital, P/B 11, Katete, Zambia

3) Using email and postal service, burn team should continue to communicate with St Francis staff and be available for consultation. Team OT will send information to physiotherapists concerning vendor sources for splinting material and recommendations concerning splinting products to use with burn patients.
4) Future teams should bring a small photo printer like the HP photosmart A516 with 3 to 4 ink cartridges and 4in by 6in photo paper. Burn team took numerous photos of patients during dressing changes and respectfully shared a few of these photos with patients and their families.

5) Future teams should bring a lightweight black and white computer printer with several ink cartridges and a ream of white paper for educational handouts for staff.

**Nutrition**

The presence of a nutritionist will now allow for continuous monitoring of the nutritional status of burn patients at SFH. Since our departure, the nutritionist has begun her role in burn care and has already made improvements. For example, F100 is now being routinely supplied to both burn units 3 times a day. The outreach committee will continue to communicate with the nutritionist to offer support, and education.

An RD should return to SFH yearly, as there is ample opportunity for the nutritional aspects of burn care to grow at SFH. Goals include:

1) Create a nutritional manual specific to burn care at SFH.

2) Develop a process for obtaining weekly weights on all burn patients.

3) Incorporate growth charts in the medical records of burn patients.

4) Increase the amount of protein served with hospital meals using local resources.

5) Ensure an uninterrupted supply of Nutritional Supplements (Plumpy Nut, F100) from outside organizations.

6) Develop a sustainable alternative to Plumpy Nut that can be prepared at SFH when Plumpy Nut is not available.

Respectfully Submitted:

Kathleen Hallowed, RN  
Maggie Dylewski, PhD, RD  
Helen Christians, OTR  
Tamra Graham, RN  
Nathan Kemalyan, MD