Practices, Training, and Perspectives of Traditional Bone Setters in Northern Tanzania

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Background

Traditional Medicine in Sub-Saharan Africa

• Since prior to colonialism, traditional medicine has remained the main source of health care across Africa, despite the growth of allopathic healthcare sectors. 1-3
• Traditional medicine encompasses a broad range of healthcare specialties, including traditional bone setting for care of musculoskeletal injury. 4
• The WHO and governments around the world recognize the importance of traditional medicine as a primary source of healthcare due to its geographic, cultural, and financial accessibility and have implemented programs to incorporate traditional healers into allopathic health systems. 5

Traditional Bone Setting and the Burden of Musculoskeletal Injury

• In Sub-Saharan Africa, there is a rising burden of musculoskeletal injury due to road traffic accidents. 6
• Access to allopathic musculoskeletal care has not expanded to meet the need, and for many, traditional bone setters bridge the gap. 7
• Complications that arise from traditional bone setting practices such as malunion and gangrene have spurred many studies to understand traditional bone setting practices with the goal of reducing negative outcomes. 8-10
• Some studies also call to train bone setters to incorporate them into the allopathic health system and take advantage of their strengths such as geographic, financial, and cultural accessibility. 11,12
Methods

Between June and July 2017, we interviewed six self-described traditional bone setters located via word-of-mouth in the Northern Tanzanian regions of Kilimanjaro, Arusha, and Manyara.

Fig. 1: Map of Tanzania with Kilimanjaro, Arusha, and Manyara regions highlighted. We interviewed two traditional bone setters from each of these regions.

References: University of Pennsylvania Perelman School of Medicine - Philadelphia/US
Interviews:

- occurred at either the bone setters’ places of work or homes
- were conducted by a foreign investigator in English and translated into a language comfortable for the bone setters by a local investigator fluent in both English and Swahili or Maa with experience in research translation
- lasted 1-2 hours
- were semi-structured around the practices, training, and perspectives on allopathic medicine for musculoskeletal injuries
- were recorded, transcribed, translated into English, and analyzed in Nvivo 11 using an inductive framework method.  

Fig. 2: A traditional bone setter at his home in Arusha Region.

References: University of Pennsylvania Perelman School of Medicine - Philadelphia/US

Bone setter consent was obtained verbally prior to the day of the interview and written on the day of the interview.
Images for this section:

Fig. 2: A traditional bone setter at his home in Arusha Region.

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Fig. 1: Map of Tanzania with Kilimanjaro, Arusha, and Manyara regions highlighted. We interviewed two traditional bone setters from each of these regions.

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Findings

Training:

- Men from previous generations of their families pass down knowledge of bone setting (n=4).
- One bone setter had undergone multiple trainings on allopathic techniques organized by municipal governments and conducted by health workers (n=1).
- The highest level of education attained was primary school by two bone setters (n=6).

Livelihood & Practice Volume:

- Only one traditional bone setter practices full-time while the rest support themselves by either selling traditional medicines (n=2) or with a pastoralist lifestyle (n=3).
- The volume of patients treated ranges from 2 to 500 per year (n=6).
- Patients come from the bone setters' surrounding areas, and are recruited via word-of-mouth (n=6).

Practices:

Table 1: Traditional bone setting techniques reported by traditional bone setters in Northern Tanzania (N=6).

<table>
<thead>
<tr>
<th>Fracture Location</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>- palpation (6)</td>
</tr>
<tr>
<td></td>
<td>- sending patients to an outside clinic for x-ray imaging (1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reduction</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- massaging (5)</td>
</tr>
<tr>
<td></td>
<td>- manual traction by pulling on the affected body part (2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fixation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- animal hide (Figure 2) or pieces of wood tied around the affected body part (6)</td>
</tr>
<tr>
<td></td>
<td>- use of clothing, pieces of discarded mattress, or pharmacy supplies for padding against the patient's skin (6)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wound Care</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Traditional Techniques:</td>
</tr>
</tbody>
</table>
- use of topical and oral traditional medicines for antisepsis and anti-myiasis (5)

- wound desiccation (2)

- suturing with unsterilized sewing needles and cotton thread (1)

- washing wounds with saltwater (1)

**Allopathic Techniques:**

- use of disposable gloves (4)

- boiling for sterilization (2)

- use of pharmacy-bought alcohol and iodine for antisepsis (3)

- use of pharmacy-bought wound dressings (2)

- sending patients to a hospital to receive tetanus vaccination (1)

- consulting a medical nurse to dress wounds with sterile technique (1)

- sending patients to a medical doctor for antibiotic prescription (1)

**Malunion**

- breaking the healed fracture site using bare hands, a stick, or a hammer (5)

**Follow-up**

- everyday if patients stay in the bone setter’s home (2)

- every other day to every two weeks if patients stay at their own home (5)

*Numbers in parentheses represent the number of traditional bone setters that practice the technique.

**Table 2:** A quote describing a bone setter’s treatment of an open fracture.

"I enter a finger into the wound to remove small bones which might have been left in the wound. After that I massage the protruding bone until it gets in its position, then..."
I stitch the wound, but leave gaps to ensure that there is a place to put the herbs through…If the wound is small, then I will have to enlarge it myself with a knife so that I can get out the small pieces of bones… I don't have [gloves] I just do it bare handed and afterwards I wash my hands.”

Fig. 3: A model wearing an adjustable cow hide splint used by two of the pastoralist traditional bone setters.

References: University of Pennsylvania Perelman School of Medicine - Philadelphia/US

Table 3: Cost of fracture care by age of patient. All bone setters price their services as a set package depending on injury location and type (N=6).

<table>
<thead>
<tr>
<th></th>
<th>Cost in USD</th>
<th>Cost in Livestock</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>$75 to $220</td>
<td>cow or calf (3)</td>
<td>- varies based on ability to pay (1)</td>
</tr>
<tr>
<td>Child</td>
<td>$22</td>
<td>goat or sheep (3)</td>
<td>- varies based on satisfaction with care (1)</td>
</tr>
</tbody>
</table>
Numbers in parentheses represent the number of traditional bone setters that charge in this way.

Perspectives on Allopathic Healthcare:

- All bone setters interviewed believe allopathic medicine is competent in treating musculoskeletal injuries, but they did voice concerns about low quality of care (Table 4) and limitations in access such as prohibitive expense (n=6).

**Table 4**: Quotes of common concerns traditional bone setters have regarding allopathic healthcare.

**Theme: Infrequent follow-up**

- “The problem with the hospital is that once they put a patient in POP [(plaster of Paris)] they do not make follow-ups nor give any medicine. That is why when a patient who was once set in the hospital falls, there is a likely chance that the same place might break again.”
- “Some people in hospitals apply a full POP cast on the first day and schedule the patient for a follow-up clinic after six weeks when the swelling subsides and the POP has become loose and does not work well.”

**Theme: Malunion**

- “There are several cases of people taken to [the hospital] and they had POP on their broken legs and they recovered, but the leg is no longer straight. The problem with the hospital is that they do not stretch and massage the patient’s leg. The patient might have overlapping bones due to the accident.”
- “I have seen many patients treated in the hospital and they have lame legs or hands, but for me, it has never happened that I treat a patient and the leg or hand bends. For this reason, I do not completely trust the hospital and neither do my patients.”

Perspective on Collaboration with Allopathic Healthcare:

- All bone setters endorsed a willingness to collaborate and to undergo trainings in allopathic techniques for musculoskeletal care (n=6).
- Most of the bone setters recognize some cases are beyond their capacity to treat and have referred patients to a hospital (n=5). Cases that are referred include head, neck, and spine injuries, as well as gangrene and severely comminuted fractures.
- Suggestions of collaboration to improve their own practices included connecting with allopathic specialists (n=3), accessing allopathic supplies such as anesthesia, x-ray, and allopathic splinting materials (n=3), and attaining help building wards for their patients in recovery (n=3) (Table 5).
Table 5: Quotes of traditional bone setters regarding collaboration with allopathic healthcare.

- "There is a Maasai saying, 'One pillar cannot support the house’…We [should] build unity between us and the hospital... If there is a case that the hospital cannot do they can consult me and if there is any case that I cannot treat then I consult the hospital."
- "The best way is coming together, working together and identifying shortages in hospital procedures and in the traditional procedures."
- "I want to be provided with equipment to replace the local ones I have like the hide...I want you to connect me with specialists in the hospital so that we work together and my work will improve."
- "If I get someone to anesthetize the patient it will be a very good step because now what we do is the patient is held with strong men to prevent him from being uncooperative during the procedure because of pain."
Fig. 3: A model wearing an adjustable cow hide splint used by two of the pastoralist traditional bone setters.

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Interpretation

There is a need to train traditional bone setters due to safety concerns:

**Table 6:** Traditional bone setting techniques and associated safety concerns.

<table>
<thead>
<tr>
<th>Technique</th>
<th>Safety Risk</th>
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</thead>
<tbody>
<tr>
<td>splinting without using radiographic imaging</td>
<td>malunion, nonunion</td>
</tr>
<tr>
<td>manipulating or creating wounds with unsterile tools</td>
<td>infection</td>
</tr>
<tr>
<td>using blunt trauma to re-break bones</td>
<td>further unnecessary injury</td>
</tr>
</tbody>
</table>

Incorporation of traditional bone setting into allopathic orthopaedic care could offer the advantages of communication networks, patient proximity, and financial affordability:

- Traditional bone setters live and work in their patients’ neighborhoods, allowing for more frequent follow-up. Frequent follow-up can catch warning signs of complications like infection for quick referral.
- The communication networks that allow bone setters to acquire patients via word-of-mouth could be harnessed to triage higher acuity patients to hospitals.
- The average cost to patients for an admission for fracture care to the orthopaedic ward at a nearby large referral hospital is $220, which is the maximum cost for the care of the six traditional bone setters.\(^\text{14}\)
- The pastoralist bone setters accept livestock in exchange for care, which may be more affordable for monetarily poor but resource rich pastoralist patients such as those from the Maasai tribe of Northern Tanzania.

Traditional bone setters are willing and able to be trained in allopathic techniques and incorporated in the allopathic healthcare system:

- Despite a low level of formal education, most of the bone setters had an understanding of the importance of infection control demonstrated by their use of allopathic techniques such as antisepsis and referral to hospitals for tetanus vaccination and antibiotic prescription.
- One bone setter had successfully undergone a government-organized training program and thereafter incorporated allopathic techniques into his practice.
- Past experience referring complicated patients to hospitals and collaborating with allopathic providers, as well as enthusiasm expressed for collaboration...
demonstrate the readiness of these six traditional bone setters to work more closely with allopathic healthcare through training and referral systems.
References

Short Bio (max. 150 words or less)

Elizabeth Card is a second year medical student at the University of Pennsylvania Perelman School of Medicine. She graduated Summa Cum Laude with a Bachelor of Science in Biology from Tufts University in 2014. After graduation she taught English at the National University of Laos, volunteered with surgical missions, and performed infectious disease research with the Lao-Oxford-Mahosot Hospital-Wellcome Trust Research Unit as a Fulbright Scholar in Laos. She is actively involved on the leadership board of the Penn Global Surgery Group and as Staff Artist of Doctors Who Create. In her free time, Elizabeth creates medical illustrations and paints expressive representations of biomedical science and surgery.