



Uniting behind a common goal: Collaboration between traditional healers and allopathic health care workers to improve rural snakebite care

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ABSTRACT

Snakebite envenoming is an acute medical emergency which affects hundreds of thousands of people worldwide, primarily in remote rural areas of low-and middle income countries in the Global South. A considerable proportion of snakebite patients turn to traditional healers (THs) for help, driven by a number of push and pull factors. These include socio-cultural factors, geographical proximity, and the absence or inaccessibility of overstretched and often costly allopathic healthcare services. Although traditional healers and allopathic healthcare staff share a common focus -the recovery and well-being of their patients- both systems operate largely in parallel to each other with collaborations being an exception rather than the rule. This is to the detriment of snakebite patients, who frequently find themselves being caught-up in the dualism between the two separate systems. Given the right circumstances, snakebite patients could benefit from elements of care from both modalities. Here, we have reviewed the role of THs in snakebite care and explored how their integration into the formal healthcare system could improve the implementation and outcome of care. The effective recruitment of THs to aid in disease control and treatment efforts in diseases other than snakebite underscores the potential benefits of this strategy. Carefully devised proof of concept studies are needed to test our hypothesis that collaborations between the formal healthcare sector and THs are feasible and improve outcomes in snakebite care.

1. The role and scope of traditional healers in snakebite endemic regions

An inguinal hernia? An ill-fated marriage? A venomous snakebite? Traditional healers (THs) are being widely regarded as a one-stop shop for healthcare and beyond and have a reputation of dealing with problems of all sorts. The use of traditional healing practices is ubiquitous around the world; 170 World Health Organization (WHO) member states acknowledge the role of traditional and complementary medicine within their health systems (World Health Organization, 2019). The share of the population reaching out to traditional forms of healthcare varies largely per country and region (Ediriweera et al., 2017; James et al., 2018; Pengpid and Peltzer, 2021; Snow et al., 1994). Quantifying the exact extent of traditional healthcare utilization is difficult, in part because patients are loath to disclose consultations with THs (James

et al., 2018; Schioldann et al., 2018; Chuat et al., 2021). Nonetheless, it is worthwhile reporting available estimates to highlight how common it is. In sub-Saharan Africa, a meta-analysis (James et al., 2018) based on 26 studies found that an average of 58% of the general population made use of traditional care practices. Use of traditional forms of care was estimated in the general population were also reported to be common in India (13%) (Pengpid and Peltzer, 2021); The Philippines, China and The Republic of Korea (>50%); France, Japan and Australia (>30%); and finally >20% for the USA (Pengpid and Peltzer, 2018). Clearly, traditional forms of healthcare are employed across all strata of economic development, although for patients in high- and middle income settings with adequate access to and availability of allopathic healthcare, utilization of traditional forms of therapy is more frequently a matter of personal choice. This cannot be said of patients living in regions where allopathic healthcare resources are sparse or non-existent,

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which is particularly true for the setting of snakebite envenoming.

Snakebite envenoming is a neglected tropical disease that kills up to 94 000 people annually (Kasturiratne et al., 2008). The number of patients incurring disability through snakebite is likely of similar magnitude (Chippaux, 2011; Aglanu et al., 2022; Habib et al., 2015) if not higher, though reliable estimates are still outstanding. Regions where venomous snakebite is most endemic are South- and Middle America, Sub-Saharan Africa, India and the East and South-East Asia-regions (Kasturiratne et al., 2008). The affected populations are predominantly situated in rural communities where livelihood activities such as subsistence agriculture, fishing, herding of live-stock, fetching water, collecting firewood, and factors such as lack of adequate footwear, poorly built houses and proximity of livestock to residences all pose an increased risk of snakebite (Harrison et al., 2009; Vaiyapuri et al., 2013). In line with this, a significant correlation has been shown between snakebite incidence and indicators of economic development (Harrison et al., 2009; Jayawardana et al., 2020). Moreover, access to allopathic healthcare is limited in regions where snakebite is most endemic (Barber et al., 2017). The majority of the global snakebite disease burden thus falls onto patients who find themselves in what the late Dr. Farmer termed a 'Medical Desert' (Farmer, 2020, p.4) - regions essentially devoid of or severely lacking allopathic healthcare infrastructure. In this 'Medical Desert', traditional healers are more often than not the only sources of healthcare that cater to the medical needs of the local population. And even if healthcare institutions are present, a number of different factors, touched upon later in this article, may direct patients towards THs. The share of snakebite patients consulting traditional healers as estimated from community surveys is substantial: 43% in Sri Lanka (Ediriweera et al., 2017), 67% in India (Armstrong et al., 2019), 68% in Kenya (Snow et al., 1994) and 38% in Cameroon (Alcoba et al., 2020). It is therefore indisputable that THs are positioned at a critical juncture of snakebite patients' care seeking process. This article will review the role of traditional healers in snakebite care and seeks to examine how the efforts of THs could be harnessed to the benefit of snakebite patients.

1.1. Why traditional healers are and will likely remain providers of snakebite care

A number of factors place THs in a unique position with regard to snakebite care. Of foremost importance is their physical proximity to the people who are at highest risk of snakebite: people living in remote, agricultural communities (Harrison et al., 2009; Musah et al., 2019; Steinhorst et al., 2021; Arias-Rodríguez and Gutiérrez, 2020). From a geographical point of view, THs are on average more readily accessible than health facilities. Their relative proximity is best reflected by the fact that 37% of all patients who consulted THs in a Rwandan study reported that the TH came to their home following the bite (Schurer et al., 2022). A community survey in Sri Lanka found seeking allopathic healthcare was associated with travelling longer distances than receiving aid from THs (Ediriweera et al., 2017). This issue was also raised by community members in Myanmar (Schioldann et al., 2018) and echoed by snakebite patients in India and Cameroon, who reported that flooded rivers, poor roads and lack of transport impeded their trip to hospitals (Chuat et al., 2021; Armstrong et al., 2019). The geographic accessibility of THs is not only reflected in their physical proximity to affected communities, but also in terms of the time it takes for snake-bitten patients to seek care: Snow et al. (1994) report data from a community survey in Kenya, in which 82% of patients who consulted THs managed to do so within 1 hour following the bite. Similarly, in Cameroon snakebite patients reached THs within a median delay of 45 minutes after the bite (Alcoba et al., 2020). A hospital-based snakebite patient survey in South Africa found that patients reached THs within a median of 15 minutes after the bite, as opposed to a median bite-to-hospital time of 7 hours and 15 minutes (Sloan et al., 2007). Similarly, in Nigeria, 71% of snakebite patients travelled more than 100 kilometers to the hospital and 48%

presented 8 hours or later after the bite (Muhammed et al., 2017). It is important to acknowledge, however, that consulting THs and hospitals are not independent pathways to care-seeking, but that both care modalities can be sought after one another (Ediriweera et al., 2017; Steinhorst et al., 2021). In judging the available data, it must therefore be borne in mind that THs are frequently blamed for the delayed presentation of snakebite patients to allopathic health facilities (Schioldann et al., 2018; Alcoba et al., 2020; Schurer et al., 2022; Sloan et al., 2007; Wood et al., 2009). Regardless of the sequence of care-seeking, the data shows that many patients can in fact reach THs within the 'golden' first hours following their injury-a critical time period in which life-saving interventions can effectively be instituted (Quick et al., 2014). In the case of snakebite, this is particularly relevant to neuro-and hematotoxic envenomings with the potential to cause respiratory paralysis, hypovolemic shock and cerebrovascular accident. To ensure an effective referral mechanism of the critically envenomed, THs would require more knowledge on alarming symptoms or signs that require immediate referral or assistance of such patients to the clinic. In a shared care model, THs and health care workers could explore how best to recognize the considerable number of mildly or non-envenomed snakebite patients the TH can tend to (Kasturiratne et al., 2008), relieving the burden on hospitals and reducing treatment costs for patients.

Furthermore, in many snakebite endemic areas, the number of doctors is tiny in comparison to the number of traditional healers. For example in the whole of Ghana, as of 2017, the doctor patient ratio was approximately 1/8000 population and the ratio of nurses to population was 1/800 (Ministry of Health, 2018), translating to 11 healthcare staff per 8000 population. In comparison, the traditional healer patient ratio was estimated to be around 1/400 (Barimah, 2016), which equates to approximately 20/8000 population. There are also distinct rural-urban differences with physicians and nurses clustered predominantly in urban centers and found sparsely in the rural areas where snakebite is most endemic. Ghana is illustrative in this regard: 40% of all doctors in the country are located in and around the capital region of Greater Accra (Ministry of Health, 2018).

Another major determinant of health seeking behavior are the financial costs involved. Hospital-based healthcare can be immensely expensive, relative to the financial means of snakebite patients, particularly if antivenom, surgery and prolonged admission is necessary (Brown, 2012; Kasturiratne et al., 2017; Magalhães et al., 2020). Meanwhile, healers are often said to charge little to nothing and offer alternative methods of payment, such as paying in kind or in labor, that are favorable to patients (Schioldann et al., 2018; Chuat et al., 2021; Steinhorst et al., 2021; Schurer et al., 2022). Even if patients prefer hospital-over traditional care, the costs remain a decisive variable in the care-seeking decision process. In the face of ever-growing healthcare costs globally and considering the high share of out-of-pocket healthcare expenditures (>40%) in low income countries (World Health Organization, 2020a), THs offer both superior accessibility and lower financial barriers.

The issue of accessibility in the setting of snakebite care extends far beyond the geographic and financial realms to encompass cultural, social and spiritual dimensions. Qualitative research has identified that the alignment of THs with the beliefs, traditions and cultural and social values that prevail in the societies to whom they cater is a major determinant of health seeking behavior (Schioldann et al., 2018; Steinhorst et al., 2021; Krahl et al., 2018; White, 2015). In many of the societies where snakebite envenoming is endemic, the occurrence of a snakebite is fraught with mystical-spiritual connotations (Schioldann et al., 2018; Chuat et al., 2021; Steinhorst et al., 2021; Arias-Rodríguez and Gutiérrez, 2020; Schurer et al., 2022; Owuor et al., 2005). As a result, snakebite envenoming is frequently not perceived as a purely biomedical phenomenon, meaning spiritual interpretations often weigh heavily on the treatment-seeking process. In addition, the mental disease burden linked to snakebite, as identified in scientific literature appears to be substantial (Aglanu et al., 2022; Vaiyapuri et al., 2013;

Arias-Rodríguez and Gutiérrez, 2020; Muhammed et al., 2017; Wijesinghe et al., 2015; Williams et al., 2011). For example, levels of depression and post-traumatic stress disorder were found to be as high as 54% and 21%, respectively, among snakebite patients in Sri Lanka (Williams et al., 2011). It is clear that the allopathic healthcare systems in endemic areas, already falling short in psychiatric and mental health care coverage (World Health Organization, 2020b; Saxena et al., 2007), could benefit immensely from counselling services offered to snakebite patients at the community level (Muhammed et al., 2017; Wijesinghe et al., 2015). With the right approach, THs could potentially contribute to alleviating the psychological disease burden of snakebite. In this vein, integrating THs into allopathic healthcare services offers opportunities for improving patient follow-up post-discharge in the outpatient setting. This is particularly relevant in the setting of snakebite envenoming, in which patients often struggle to afford prolonged hospital admissions (Schliodann et al., 2018; Harrison et al., 2009; Steinhorst et al., 2021; Arias-Rodríguez and Gutiérrez, 2020; Brown, 2012) and in which long-term follow-up, especially with regard to disability and morbidity, is notoriously challenging (Aglanu et al., 2022; Brenes-Chacon et al., 2020; Jayawardana et al., 2016; Kasturiratne et al., 2021). Many patients and THs see promise in therapies offered at the hospital, most notably antivenom (Chuat et al., 2021; Vaiyapuri et al., 2013; Steinhorst et al., 2021; Schurer et al., 2022). Strengthening collaborations with THs could spur a larger proportion of patients to seek care at the hospital for urgent and life-saving measures, while possibly relying on the less costly services of THs during their recuperation period. Community health volunteers may also be involved in snakebite care, therefore the optimal collaboration will differ per region. Harnessing the workforce of THs has the potential to link-up patients with the formal healthcare system, but to also follow them for longer than previously possible, benefitting patients and research efforts alike.

1.2. Can collaborations with THs really work? A look at the evidence

The WHO and other global actors have called for increased efforts to acknowledge and leverage the role and value of THs, and to harness the potential contribution of THs to healthcare (National Academies of Sciences, Engineering and Medicine, 2018; World Health Organization (WHO), 2019; World Health Organization (WHO), 2013). This has led to a growing body of research on integrative practices and collaboration between THs and formal healthcare systems across the treatment pathway. These experiences provide concrete examples and offer valuable lessons on the benefits and challenges associated with this approach. We therefore outline examples of collaboration in patient referral, case-diagnosis, and community-based treatment of patients using case-studies from settings similar to those where most snakebites occur.

1.3. Patient referral

Human African Trypanosomiasis (HAT) or Sleeping Sickness is a vector-borne parasitic disease, caused by the parasites *Trypanosoma brucei gambiense* and *rhodesiense*, and endemic in 36 African countries (Kennedy, 2013; Kennedy and Rodgers, 2019). Gambiense HAT cases account for 98% of the disease burden (Barrett, 2018). WHO in partnership with disease endemic countries, via National Sleeping Sickness programs have progressively reduced the global number of gambiense HAT cases by 96% between the years 2000 and 2018, and they aim to eliminate community transmission by 2030 (World Health Organisation (WHO), 2012). A significant hindrance to achieving this goal is the increasing number of people screened per case detected, and the logistic and final challenges associated with case-finding (Barrett, 2018). Nolna et al. (Kwedi Nolna et al., 2020) investigated the effect of integrating THs to facilitate case-finding in seven central African countries, using a prospective quasi-experimental study design. They selected THs in seven endemic countries and trained them in recognizing symptoms of HAT

and referring suspected patients for confirmation. They then compared the number of HAT cases detected before and after the intervention and found an increase from 22 to 32 HAT cases in 6 months (Kwedi Nolna et al., 2020). In the context of elimination where disease prevalence is low, small increases in detected case are crucial in achieving elimination goals. Hence the authors conclude that integrating THs was feasible, cost-effective, and an asset in the elimination of HAT (Kwedi Nolna et al., 2020). This study highlights the possibility of utilizing the proximity and accessibility of THs and integrating them as primary referral points from the informal into formal healthcare pathways.

1.4. Case diagnosis

The main entry point into the HIV care pathway is HIV counselling and testing, and improving uptake is crucial in the global fight against HIV (UNAIDS. HIV Prevention, 2020). Recent development of accurate and easy-to-use oral swab HIV tests now allow self-testing alone or with a trusted person, creating an opportunity to include informal providers in the HIV care pathway (World Health Organisation (WHO), 2019a and b; Zachary et al., 2012). Sundararajan et al. (2021) investigated HIV counselling and point-of-care testing by THs in Uganda in a cluster-randomized trial. Eligible THs were identified from a population census of THs in the study area, and they were randomly assigned to an intervention and a control arm. Both groups received training on pre- and post-test counselling, and the intervention group received extra training on the administration and interpretation of Oraquick HIV testing kits, while the control group received training on referral for HIV testing and the location of nearby HIV testing sites. There was a 100% uptake of HIV tests delivered by THs, while only 23% of participants in the control group received an HIV test after referral. There were no new HIV positive cases in the control group, while seven of the 10 participants with a new positive test in the intervention group were linked to a formal HIV care pathway by the THs and they all initiated antiretroviral treatment within 90 days of taking the HIV test. Both clients and THs felt the intervention was acceptable and the authors conclude that integrating THs into the HIV care pathway could increase the uptake of HIV counselling and testing, and expand HIV testing in hard-to-reach populations (Sundararajan et al., 2021). HIV and similar conditions where patients are exposed to stigma and discrimination could benefit from the perceived trust and confidentiality that are associated with THs, thereby allowing early detection and treatment initiation for these patients.

1.5. Mental health and community-based care

Traditional and faith healers have historically provided services to patients with mental health disorders, and they make up an important part of the mental health workforce, especially in low- and middle-income settings (Burns and Tomita, 2015). Care-seeking behavior is complex and many patients use traditional and formal healthcare pathways during the same episode of illness, and the chronic nature of mental health disorders makes it common practice (Nortje et al., 2016). Using THs to optimize mental health care has previously raised concerns around ideological differences in the interventions and expected outcomes from both care systems (Nortje et al., 2016). Also, the use of potentially harmful treatments by THs such as shackling, prolonged fasting and the use of unproven herbal preparations have contributed to delays in active integration efforts (Campion and Bhugra, 1997; Minas and Diatri, 2008). Several models such as including task-shifting, integration and a collaboration model have been suggested, with the collaborative model having the broadest range of activities of THs, thereby maximizing their contributions, and allowing them to maintain their autonomy and independence (Nortje et al., 2016). Gureje and collaborators (Gureje et al., 2020) assessed the effectiveness of a collaborative shared care model for patients with psychosis, delivered by traditional and faith healers and conventional primary care providers

in Ghana and Nigeria, in a cluster-randomized controlled trial. The conventional primary care providers in both the intervention and control groups received training on the medical management of psychosis, while traditional and faith healers were trained on common signs and symptoms of psychosis and on avoiding harmful treatment practices. In addition, the traditional and faith healers and the conventional primary care providers in the intervention group received further training on modalities for implementing collaborative shared care. The shared care model involved patients admitted in the facilities of the traditional and faith healer, with the primary care provider making visits to provide clinical support and manage acute psychotic deteriorations. Compared to patients in the control group, patients who benefitted from collaborative shared practices had clinical improvement in positive symptoms such as delusions and hallucinations, negative symptoms such as emotional withdrawal and general psychopathology symptoms such as disorientation and lack of insight. These patients also had functional improvements with significantly less disability, better course of illness, and better adjustment to work (Gureje et al., 2020). There also was a reduction in the use of harmful treatment practices by traditional and faith healers in both study groups. This study shows that it is possible for THs and formal care providers to work together, while acknowledging and respecting individual ideological differences between both care systems, ensuring patients are treated humanely, and providing clinical treatment in the setting most convenient to the patient, all with positive patient outcomes. The reduction in harmful treatment interventions through the training of traditional and faith healers and regular interactions with conventional care providers demonstrates that building trust and improving personal relationships between THs and formal care providers, can improve patient care and TH practice. It also shows the possibility of overcoming distrust, which is an important barrier to the collaboration between formal care providers and THs, and their integration into formal treatment pathways (van der Watt et al., 2017). A similar model was assessed by Sarmiento et al. (2022) in Mexico, where they showed that, amongst indigenous women who preferred home births, greater collaboration between traditional birth attendants and health care workers resulted in better perinatal and maternal outcomes. They co-designed the study with traditional healers and laid an emphasis on mutual respect and understanding of roles, further pushing the limits of collaboration beyond patient care. This is crucial for fields without prior frameworks of collaboration between TH and allopathic care providers, as it can create stronger bonds at the outset and could improve the quality of the interactions going forward.

These examples offer valuable insights into how THs and allopathic care providers can harmonize their efforts to improve patient care and offers practical approaches to achieve this collaboration. Key elements to consider in these collaborations include involving both parties early in the collaborative process, ensuring that the collaborations are based on mutual understanding and respect for each profession; aligning interventions with patient preferences; ensuring that patient care remains safe; and prioritizing continuous and mutually beneficial collaborations to ensure sustainability of the interventions. For an exhaustive description of an exemplary collaborative initiative between THs and allopathic care providers, we refer to Awah et al. (2018) who launched such a project for Buruli ulcer care in Cameroon. In the comprehensive analysis of their multi-year effort, the authors provide a detailed description of their study set-up and show how relevant procedural milestones and health metrics can be combined in the final evaluation.

2. Conclusion

Given that the greatest burden of snakebite occurs in rural communities where there is an intersection between a limited access to adequately resourced healthcare facilities and strong sociocultural ties with traditional healing systems, collaborations between THs and formal care providers have the potential to improve the care offered to snakebite victims. Above we demonstrated the breadth of opportunities for

potential collaboration between TH and health care workers which led to more effective and safe care. The opportunities of the collaboration should be explored together with THs but could involve i) training in diagnosis of snakebite, first-aid practices and avoidance of harmful practices, such as tourniquets ii) agreeing on the need for immediate referral of critically envenomed patients to hospitals, and iii) follow-up care in the community, including mental health. Ensuring safe and effective treatment by THs at the community level could additionally have favorable spill-over effects into the community, where people might adopt such practices too. Importantly, the exchange of knowledge on snakebite between allopathic practitioners, THs and their affected communities should be reciprocal.

A number of factors are likely conducive to future collaboration. These include THs' faith in antivenom, patients' demand for elements of traditional- as well as hospital medicine, the willingness of many healers to learn from hospitals, the levelled complexity of envenomed versus non-envenomed snakebites requiring attention from very different echelons of healthcare, and lastly, the cost-benefits for patients arising from a shared care model. With multiple frameworks and models to choose from, putting the concept of a shared care model for snakebite envenoming to the test is an important next step.

Author contributions

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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