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"WRAPPING" UP IN KENYA:

A Student's Learning Experience in Eldoret, Kenya

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Alexander R. Mills received his Doctor of Pharmacy degree in May 2017 and has completed a PGY-1 community-based pharmacy practice resident with Walgreen Company and Purdue University College of Pharmacy. During his time at Purdue, he was heavily involved with Purdue's chapter of The American Red Cross Club, serving as the president and coordinator of community outreach programs. Upon completing his PGY-1, he will continue to pursue his aspirations to care for the medically underserved while currently completing a PGY-2 residency specializing in ambulatory care and academia at the University of Mississippi in Jackson.

INTRODUCTION

Globally, 70% of patients with HIV/AIDS live in Sub-Saharan Africa (SSA) (UNAIDS, 2014). Perhaps just as debilitating as the physical effects of their disease, HIV-associated stigma can wreak havoc on an HIV-positive patient's life; 50% of men and women with HIV report experiencing stigma in the forms of prejudice, negative attitudes, and abuse due to their status (Stangl, Lloyd, Brady, Holland, & Baral, 2013). This also affects patients' health, as 1 in 8 people living with HIV report being denied healthcare due to HIV-related stigma (Stangl et al., 2013). A survey of patients with HIV reveal that the stigma revolves around the misconception of its route of transmission and the patient's risky behaviors (Chinouya, Hildreth, Goodall, Aspinall, & Hudson, 2017).

Almost one in ten patients with HIV develop cancer, with 70% of these malignancies being defined as an AIDS-related cancer (Spagnuolo, Galli, & Salpietro, 2012). Furthermore, one of these AIDS-related cancers, Kaposi Sarcoma (KS), can cause lymphedema (fluid retention and swelling), particularly in the lower extremities. Depending on the stage of the cancer, lesions may resolve with antiretroviral therapy and chemotherapy, yet sometimes the lymphedema can become a chronic condition. This persistent lymphedema can have significant negative impacts on activities of daily living and bring unwanted attention of the community, magnifying the stigma associated with their HIV-associated illness (Ahsan Ullah, 2011). By working with medical providers at the Academic Model Providing Access to Healthcare (AMPATH) in Eldoret, Kenya, Purdue University College of Pharmacy was able to engage in a service-learning project to combat KS-associated lymphedema.

AMPATH was created in 1989 as a medical exchange program between Indiana University School of Medicine (IUSM), Moi University, and Moi Teaching and Referral Hospital (MTRH) in Eldoret, Kenya (Inui et al., 2007). In 2001, a few years after its inception, a unique partnership between the United States Agency for International Development (USAID) and AMPATH was developed to address the HIV/AIDS epidemic. Currently, AMPATH

Figure 1 (banner image, above). First paste compression bandage prototype being prepared by a pharmacy student in Eldoret, Kenya.

is a partnership between Moi Teaching and Referral Hospital (MTRH) and Moi University College of Health Sciences in Kenya, as well as a consortium of North American academic medical centers. AMPATH is a supported implementing partner of the President's Emergency Plan for AIDS Relief–United States Agency for International Development (PEPFAR–USAID). Their support of AMPATH's partnership with the Kenyan Ministry of Health (MOH) serves a catchment area of 4 million people, and it has supported HIV care delivery for over 180,000 patients at nearly 150 MOH sites across western Kenya (AMPATH, n.d.). Since its inception, the partnership has expanded to provide health care for chronic diseases such as hypertension and diabetes, mental health, maternal-child health, and cancer; it is recognized as one of the largest comprehensive HIV programs in SSA.

Purdue University College of Pharmacy (PUCOP) joined the AMPATH consortium in 2003 to provide pharmaceutical care (Pastakia, Schellhase, & Jakait, 2009). A year later, an eight-week experiential training program for student pharmacists was started. The goals of this experience were to provide sustainable care in a resource-constrained setting to an underserved patient population, embed students in a global health practice, and serve as the pharmacy resource on an interdisciplinary health care team. Students are encouraged to identify and/or participate in service-learning projects associated with AMPATH and MTRH. In 2016, Purdue University College of Pharmacy students and faculty partnered with medical personnel at AMPATH to develop a locally sourced, sustainable compression therapy to treat lymphedema.

"WRAPPING" UP LYMPHEDEMA

In the United States and other high-income settings, compression therapy for lymphedema and venous stasis ulcers are standard of care (Mayrovitz, 2009). For Kaposi Sarcoma (KS), anecdotal success has been observed by dermatologists at the University of California San Francisco (UCSF), who saw improvement in lymphedema with the use of a commercially available, two-layer paste compression bandage (i.e., Unna Boot) in HIV-positive patients in the U.S. These therapy "kits" utilize cotton impregnated with zinc oxide, glycerin, and other calming lotions (i.e., calamine) and have been traditionally used to treat edema, ulcers, and sores (O'Donnell, Jr., et al., 2014). Based on the observed success reported from UCSF dermatologists, AMPATH physicians and clinical stakeholders were interested in the bandage's application in SSA due to the high prevalence of lymphedema associated with KS, but similar bandage kits were not commercially available in Kenya. From a cost perspective, the average cost of these kits in the US can range anywhere from $10 to $20, making them nearly impossible for SSA patients to sustainably afford. Funding and donations to purchase the kits provided an initial benefit for projecting their use, but ultimately sustainable purchasing was not an option for patients in SSA. To meet the needs of HIV-positive patients with KS in Kenya, a service-learning project was developed by a PUCOP student pharmacist and project team to project the use of two-layer paste compression bandage therapy in lymphedema, acquire locally sourced materials, and create a pilot kit to assess its sustainable implementation for use in a rural Kenyan setting.

METHODOLOGY

A stepwise approach to the development and implementation of the low-cost, two-layer paste compression bandage therapy was adopted. First, a literature review related to two-layer paste compression bandages, lymphedema, chronic venous ulcers, and Kaposi Sarcoma (KS) was conducted through the PubMed database with the aim of better understanding the pathophysiology, prevalence, and treatment options available for patients. The following key words were used in the literature search: "Unna boot," "HIV," "lymphedema," "compression," and "venous ulcers." Literature identified from this initial search was then manually reviewed for additional sources and background information, providing the initial rationale for two-layer paste compression bandage therapy in venous stasis ulcers and lymphedema.

After identification of needed materials to create a local, two-layer paste compression bandage therapy kit, key stakeholders (both North American and Kenyan) were identified in AMPATH leadership, dermatology, pharmacy, clinical officers, and supply chain management systems to offer guidance on the medical care and implementation of a new approach in a rural Kenyan setting. After the materials were selected, a pilot two-layer paste compression bandage kit was created and tested for usability. Training was conducted for the creation of the kits and application by clinic personnel. Finally, feedback on patient use was obtained by the clinicians.

RESULTS

The literature review identified three case reports and clinical reviews describing the use of two-layer paste compression bandage therapy for venous stasis ulcers,

KS lesions, and associated lymphedema (Brambilla, Tourlaki, Ferrucci, Brambati, & Boneschi, 2006; Gordon & Grant, 1996). After reviewing the available data, the likely benefit supported the search for a commercially available kit in Kenya. Because of the high cost and lack of available commercially sourced products in Kenya, the stakeholders decided to find locally available components of a two-layer paste compression bandage to create a comparable kit.

During the literature evaluation and product reviews, the commonly used components of two-layer paste compression bandage therapy were identified as a compression bandage treated with zinc oxide paste and glycerin paste. Zinc oxide paste and glycerin are believed to promote healing and calm skin irritation (O'Donnell, Jr., et al., 2014). Initially, the student project team member visited two local pharmacies, outside of clinic responsibilities, in an attempt to gather the materials needed to create a prototype kit; yet, materials were scarce, prompting the student to consult with local supply chain stakeholders within AMPATH for assistance. With the help of Kenya–based supply chain stakeholders, the project team was able to acquire both zinc oxide paste and the compression wrap or bandage at local pharmacies. Unfortunately, glycerin paste was unavailable in local pharmacies. Although it was challenging to acquire the necessary supplies at first, the project team was able to establish a relationship with the local pharmacies to ensure an adequate, sustainable source of needed supplies for future kits.

Since the project team wanted the locally designed, two-layer paste compression bandage kit to replicate the results seen from UCSF dermatologists as closely as possible, they consulted one of the lead dermatologists about the proposed design. They sought guidance on the sterility of the components, exclusion criteria, and the elapsed time between changing the two-layer paste compression bandage. The student project team member also consulted with his mother, a wound care nurse, to brainstorm design considerations for a prototype kit. Once these aspects were addressed and agreed upon by the entire project team, the student team member began creating a prototype kit.

The first two-layer paste compression bandage prototype kit included: a roll of cotton gauze, bulk zinc oxide paste, and a roll of outer bandage for compression. The creation of the first prototype by the student project team member followed these steps: (1) rolling out cotton bandage on a flat surface, (2) spreading a thin amount of zinc oxide paste over the entire role using a dull knife, and (3) wrapping in clear plastic or tin foil wrap to maintain moisture. This ended up being a laborious process, taking around 45 minutes to complete just one kit.

Figure 2. Pharmacy student wearing the first paste compression bandage prototype.

After creation of the first kit, the student project team member created three additional kits: one to assess ease of use and comfort of the two-layer paste compression bandage for patients, one to share with the entire project team, and one to assess shelf life. Ease of use and comfort was assessed by placing one of the kits on the student's healthy leg for three days without removal. The student project team member reported that the kit was quite comfortable and easy to wear while working at the hospital, bathing, and sleeping.

With positive pilot testing results on a healthy leg, the project team provided training on the assembly process to local health care providers. The training involved the steps described above, done in a clean environment, and the development of a method for distribution. The training focused on proper compression technique, appropriate use, when to avoid compression therapy, and monitoring of a patient's progress through prepared forms to aid in documentation of progress and clinical decision-making.

Increased and sustained access to these kits was made possible by AMPATH's revolving fund pharmacy. The revolving fund pharmacy provides Kenyan patients reliable access to affordable medications via an innovative and sustainable practice model and has 22 locations throughout western Kenya, providing a consistent method for product distribution and tracking (Manji et

al., 2016). To date, more than 200 compression bandage kits have been made. While cost is still a concern for some patients, the kit is sold for 200 KSH (approximately $2 U.S.), which is substantially less than the commercially made alternatives available in the U.S.

Since the inception of the project, the locally made, two-layer paste compression bandage has been utilized for more than 50 patients in treating various diseases, including venous stasis ulcers, lymphedema secondary to KS, and even wound care for both hospitalized and ambulatory patients throughout western Kenya. At the time of drafting this article, growing interest of the Kenyan two-layer paste compression bandage therapy summated in the receipt of pilot funding and IRB approval to conduct a study to evaluate the use of the two-layer paste compression bandage therapy for managing post-traumatic ulcers, venous stasis ulcers, and KS lymphedema with a National Institutes of Health-Clinical and Translational Service Award project grant for the study titled "Kenyan Improvised Compression Therapy for Kaposi Sarcoma (KICKS)." The aim of this study is to evaluate the use of the two-layer paste compression bandage therapy in the treatment of KS-associated lymphedema. The ultimate goal is to take this care element into the community setting and teach patients and caregivers application of the two-layer paste compression bandage therapy to increase accessibility.

Figure 3. Paste compression bandage kit taken in Eldoret, Kenya.

COMMUNITY AND STUDENT IMPACT

The student project team member began this service-learning project with little understanding of how impactful it would be both for him and the people directly affected by the two-layer paste compression bandage. Reflection of his service learning project revealed the following:

> Thinking back on my time in Kenya, the idea of designing an alternative therapy for patients with a debilitating disease seemed like a completely foreign idea to me. What really drove me to take this idea from start to finish was focusing on the needs of the patients I was ultimately hoping to serve and improve their lives.

Establishing the Kenyan two-layer paste compression bandage therapy was the student's first exposure to needs-based care in a resource-constrained setting, teaching him that the rate-limiting step to service is not always financial resources, but drive.

Further reflection for the student revealed the impact this service-learning project had on him beyond his experience in Kenya:

> I remember listening to one of my preceptors during one of our first meetings in Kenya sharing when he came to the realization [that] his original training in infectious disease wasn't what his patients needed the most. He saw the need for more management of other chronic disease states and poured his energy and focus into meeting those needs. At the time, that idea absolutely floored me, but now it drives my professional development. Ever since then, I've approached my philosophy of practice to be passionate about not just what I'm interested in, but rather what the need is for the patients I'm serving.

Developing a service in an area with such limited resources allowed the student to apply his creativity and patience when working with the unknown, requiring him to constantly reflect on the "why" as his source of motivation for achieving his goals. These skills and self-reflection have carried on to his current professional aspirations to work in an environment providing needs-based, patient-driven care for the medically underserved

in the United States. "I grew to appreciate the challenge in finding the best way to care for our underserved and cherish the moment when you can celebrate that victory after finding a way to fill even the smallest patient need," he reflected.

The student also gained self-confidence, encouraging him to embrace creativity when solving patient needs and to continue to search for opportunities to "step outside [his] comfort zone" through patient advocacy and projects.

> [This project and experience] revealed to me that if I keep the needs of the patient at the forefront of my mind when entering a new experience, it's a lot less intimidating—even if it's something I have not previously experienced. If my patients need me to figure it out, that trumps feeling uncomfortable.

He continued to share the unexpected emotional development that followed:

> Initially, this experience for me started off as a moment of significant learning related to patient care. Instead, I learned [that] knowledge only plays a small role in the process; putting my heart and passion into what I do and who I serve will take me, my patients, and my team a long way.

The student continues to benefit and learn from this experience thanks to the continued efforts of the dermatologist from UCSF who has expanded the service-learning project throughout Kenya. Alex has gained a broader understanding of the steps and collaboration needed to produce a high-quality project that showcases the impact he and his colleagues can have on global patient care. The collaboration between them also revealed the student's interest in interprofessional education, with the student sharing:

> Working with another healthcare professional such as Dr. Chang motivates me to search for more opportunities to collaborate as part of a medical team to positively impact as many patients possible. You hear time and time again how team-based care is important, and this experience gave me the "ah-hah" moment that drove home how I can play a strong role on a team in the near future.

Not only has the student pharmacist benefited from this service-learning project, but other professionals involved have also learned a great deal. Clinical officers and nurses, the frontline providers, are keenly aware of how much wounds and lymphedema affect and limit their patients, and they often express frustration from lack of resources to help. They now have something to offer, and they have had several training opportunities to learn how to manage wounds and lymphedema. The dermatologist continues to be impressed by the synergistic impact that motivated individuals, working together, can have, which is infinitely greater than multiple individuals working separately. Each member of this service-learning project has had unique skills and knowledge to contribute that enabled Alex's pilot wrap to evolve into something much greater. One of the biggest lessons the dermatologist has learned is that one can never predict how an innovation will be used. Originally, these locally made, low-cost paste compression bandages were intended for use with conditions that are known to benefit from compression when used in resource-replete settings, such as venous stasis ulcers and lymphedema. Since their introduction, these paste compression bandages are also being used with compression for traumatic wounds and without compression for diabetic foot ulcers, blistering skin disease, and general wound care. In resource-replete settings, there are a plethora of products to choose from for general wound care, and Unna boots or something similar would not be used. However, in a resource-constrained setting, where wound care resources are scarce, these locally made paste compression bandages represent a ready-made, available product for wound care—whether or not it is used with compression. "You never know how something will be adopted, adapted, and repurposed. It's important to keep an open mind and ask yourself why something is happening that you didn't expect. There's likely a lot to learn from the answer," shared the dermatologist.

CONCLUSION

The impact of this project has progressed beyond patients with venous stasis ulcers and KS-associated lymphedema, providing care for patients with a host of conditions and treating traumatic wounds, neuropathic ulcers, and blistering skin diseases. In addition, the revolving fund pharmacy continues to expand access to these kits beyond MTRH and into several surrounding village clinics, magnifying the number of patients able to receive treatment. Reflecting on the first prototype with its challenges and comparing it to its current state has left a significant impact on Alex, providing valuable lessons from across the globe.

Alex entered the eight-week advanced pharmacy practice experience in Kenya to develop strong clinical skills, yet he left with a strong sense of his professional

vision and a passion for the underserved population. His experience with service learning resulted in the substantial growth that comes from embracing a needs-based approach to serving a community, as well as the valuable relationship stemming from invested individuals that continue to motivate and inspire beyond their professional obligations. Furthermore, Alex has taken the lessons learned from this project and channels them into motivation when working in his postgraduate career: thinking critically and valuing creativity when caring for the underserved within a multidisciplinary team. The experience showcases that service-learning experiences provide tremendous impact on students, community partners, universities, and beyond. With reflection, this project is a good example to future partners of the quality of work students can contribute and shows they are worth the investment. Furthermore, projects like these demonstrate the only rate-limiting step to making a positive impact on the community is not resources, but drive. Aristotle said, "Educating the mind without educating the heart is no education at all." His words continue to ring true when describing the impact service learning not only has on the learner's education, but also the intangibles taken from the experience.

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