

A Malawian pharmaceutical response to the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic has elicited swift and innovative responses due to the severity of the outbreak. Higher education institutions worldwide with pharmacy programs have identified vital gaps in COVID-19 care and has undertaken proactive steps to aid in the fight against the coronavirus. In Malawi, the Kamuzu University of Health Science's Department of Pharmacy initiated the production of a modified formulation of the World Health Organization's (WHO) recommended hand sanitizer. This manufacturing venture involved mobilizing the pharmacy faculty, identifying gaps in supplies and equipment, and utilizing evidenced-based information to create a high-quality sanitation product, which passed the requirements as tested by the Malawi Bureau of Standards. The department of pharmacy is expanding their distribution of the product to meet the needs of frontline healthcare workers and vulnerable populations. With historical issues of accessing care in Malawi and with COVID-19's spread among healthcare workers, this hand sanitizer venture is vital in the public healthcare's system response. The department of pharmacy will continue to lead the pharmacy profession in Malawi to provide targeted interventions in this unprecedented time.

Key Words: COVID-19, Malawi, Hand Sanitizer, Pharmaceutical Services, Pharmaceutical Preparations, Capacity Building, Academia

Introduction

On December 31st, 2019, a novel coronavirus was identified in Wuhan, Hubei province of China which is now referred to as COVID-19¹. It subsequently spread throughout the world and has infected over 300 million individuals with approximately 5.5 million deaths according to the John Hopkins Coronavirus Resource Center as of January 11th, 2022². The number of cases and deaths are expected to grow during the most recent omicron variant. The global health society has mounted responses to the pandemic through a vast array of methods. A majority of nation states have required social distancing measures for their citizens, recommended frequent hand washing with soap and closed non-essential services, medical facilities have rescheduled elective surgeries to free up hospital beds for symptomatic patients, and businesses have transitioned to virtual meetings and work.

In higher education with pharmacy programs, institutions are utilizing innovative techniques to both continue educating the next generation of health leaders and contribute to the battle against COVID-19. Global initiatives such as completely online curriculums, limiting experiential learning to a few students per session, and mobilizing students to assist in pharmaceutical care needs in their communities have been undertaken by these higher education facilities³.

More specifically, hand sanitizer production has been pursued due to its role in infection prevention of SARS-CoV-2, the virus that causes COVID-19. Hand sanitizer formulas approved by the World Health Organization (WHO) have shown to reduce levels of SARS-CoV-2 to non-detectable⁴. Ethanol, a main component of most hand sanitizers, is highly effective at inactivating enveloped viruses including coronaviruses⁵. The sudden increase in demand of hand

sanitizer to protect both the public and healthcare workforce led to adulterated products with a high concentration of methanol, instead of ethanol⁶. A metabolite of methanol can cause neurological dysfunction, blindness, and even death⁷. In Iran and the United States alone, over 700 deaths were attributed to ingestion of hand sanitizer with methanol⁸.

The authors present this case report of the Kamuzu University of Health Sciences (KUHeS)'s Department of Pharmacy in Blantyre, Malawi partaking in the response to COVID-19 through a capacity building venture centered around safe, effective hand sanitizer production.

Case Presentation

The Republic of Malawi identified their first three COVID-19 positive patients on April 2nd, 2020⁹. This date significantly passed other country's initial index case's diagnosis date in the region such as South Africa's on March 5th and Kenya's on March 13th^{10,11}. Since the index case, there have been 80,000 recorded cases and approximately 2,400 deaths from this virus according to data compiled by John Hopkins University as of January 11th, 2022². As a nation, Malawi took essential steps to aid in preventing the spread of the outbreak through launching a COVID-19 national preparedness and response plan on April 8th, 2020, distributing ventilators to the central hospitals, and recruiting an additional 2000 healthcare workers to respond to the outbreak¹². However, in their national preparedness and response plan, the Malawian government highlighted the gaps in stock of sanitation products to equip frontline workers and vulnerable populations¹³.

The KUHeS's Department of Pharmacy took a proactive approach given the urgency and seriousness of the situation. After holding discussions with various stakeholders in Malawi the department of pharmacy identified a gap in

access to good-quality hand sanitizer in the health facilities in the surrounding area. In addition to inaccessibility, hand sanitizers sold on the private market were thought to be of questionable quality based on a study conducted in Kenya¹⁴. With a formidable range of experience in the pharmaceutical industry, the department immediately performed an inventory of available supplies, contacted local Malawian companies to procure the raw materials, implemented Good Manufacturing Practices (GMPs) for hand sanitizers, and modified WHO approved formulas to produce a high-quality, easily replicable, and affordable product.

The initial manufacturing, which was initiated in mid-March, provided hand sanitizer for several offices around the College of Medicine campus and the department of pharmacy building. After evaluating the final product, the aforementioned modifications took place. Initially, the product contained 70% ethanol, 1.45% glycerol, 3% hydrogen peroxide and distilled water according to the minimum WHO requirements. In order to create a more gelatinous product and improve skin wetting, a pharmaceutical thickener which also act as a surfactant was added¹⁵. As for production capacity, the department was manufacturing 150 liters per week at the beginning of this initiative; it has now increased to 7,000 liters per week with access to Central Medical Stores Trust (CMST) facilities and equipment. The final products are professionally finished with a KUHES label with all pertinent information: ingredients, amount, batch number, production date, and expiration date. After this product labeling, the KUHES hand sanitizers are then distributed to the interested parties including university faculty/staff, KUHES affiliates, Queen Elizabeth Central Hospital (QECH), and the local health centers in Blantyre. This final product was submitted to the Malawi Bureau of Standards and passed their test for alcohol content, pH, disinfection efficacy, dermal irritation, and freedom from physical impurities. With the aforementioned plans to scale up capacity, the department of pharmacy is strategizing to introduce the product to public citizens for preventative use.

The Discussion

Before the onset of the current COVID-19 pandemic, Malawi citizens self-reported that 60% had difficulties in obtaining care that they needed¹⁶. This virus will further expound the barriers for Malawian citizens to access adequately staffed healthcare facilities through infections of the workforce. Data has shown that 6% of patients hospitalized with COVID-19 are healthcare workers while WHO estimates that between 80,000 to 180,000 healthcare workers have died during the pandemic from COVID-19^{17,18}. The department of pharmacy's targeted intervention with hand sanitizer serves as a sanitation barrier to protect those on the frontline of treating COVID-19 and interrupting its transmission.

A study conducted in April 2020 by researchers from Germany and Switzerland showed that the original WHO based formula I (ethanol, glycerol, and hydrogen peroxide) was able to efficiently inactivate the SARS-COV-2 virus that causes COVID-19 and reduce viral titers to background level within 30 seconds⁴. This base formula that displays effective antiviral effects for this specific pathogen mirrors the compounds utilized in the department of pharmacy's hand sanitizer. To further enhance the product, the thickener agent was added to form a stable gel, provide a lotion-like texture, and serve as a surface-active agent which serves to enhance wetting of disinfected surface and possibly allow

the antimicrobial components to have maximal effect. Further research is needed to confirm that this modification has led to enhanced antimicrobial effect. The limitations of this pharmaceutical response include the inability to scale up production to meet the needs of the entire country, lack of additional agents to compare and contrast with the current WHO modified hand sanitizer formula, and gaps in funding to procure more automated equipment.

The Ministry of Health (MOH) in Malawi, upon learning of this initiative, played a pivotal role of further increasing hand sanitizer capacity at KHUEs. Through the presidential COVID-19 task force, the MOH facilitated meetings between the United Nations Development Program and KHUEs's Department of Pharmacy that led to a large grant to increase production of hand sanitizers by the department. Since the onset of the initiative to produce hand sanitizer and with the support of MOH, the department has produced over 10,000 liters packaged in 100 ml, 500 ml and 5-liter bottles. About 5,000 liters have been distributed to KUHES and its affiliated institutions. Another 5,000 liters have been distributed to government hospitals to aid in the fight against the virus. Some hand sanitizers have also been sold to private individuals and companies. Through these dispersion opportunities, the department is able to educate the hand sanitizer recipients of other prevention measures like proper use of personal protective equipment and social distancing measures.

The department of pharmacy has committed themselves to building capacity within the pharmaceutical profession while pragmatically combating the largely unknown pandemic. The hand sanitizer initiative will lend to protecting those healthcare professionals on the front line battling this virus and those who care for patients afflicted with this ailment. The service is vital in Malawi's upcoming and rising threat that COVID-19 poses to its citizens and economy. As the pandemic progresses, the Department of Pharmacy will continue to lead the pharmacy profession within the Malawian COVID-19 outbreak and will utilize their talents to serve their fellow humans.

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