

Combating Rheumatic Heart Disease in Pakistan: An Experience of Training, Screening and Community Outreach

Amna Zaheer.^{1 2} 

The Experience

Understanding Rheumatic Heart Disease

Rheumatic heart disease (RHD) is a systemic immune disorder that follows an episode of rheumatic fever, typically caused by an infection of the throat with beta-hemolytic streptococcus bacteria. RHD poses significant challenges in developing nations such as Pakistan, where it remains endemic and accounts for a substantial proportion of cardiovascular deaths among young people, contributing to approximately 250,000 deaths annually worldwide.¹ The prevalence of RHD is particularly high among children and young adults in low-income countries due to factors like poverty, inadequate healthcare resources, and poor nutrition. The prevalence of Rheumatic Heart Disease is high among children and young adults in low-income countries due to poverty, inadequate health resources, and lack of nutrition. RHD remains a significant contributor to cardiovascular mortality and disability in low- and middle-income regions, particularly affecting children in South Asia, the Pacific islands and Sub-Saharan Africa. Between 1990 and 2019, the age-standardized incidence and prevalence rates of RHD rose by 14.4% (from 11.2% to 17.0%) and 13.8% (from 11.0% to 16.0%), respectively. The incidence and prevalence rates exhibited an upward trend in areas with low and low-middle Socio-Demographic Index (SDI), while regions with high-middle and high SDI showed a declining trend.²

Darul Qalb: Mission and Initiatives

Darul Qalb, a U.S.-based organization founded in 2014, is dedicated to eradicating RHD in low- and middle-income countries like Pakistan and Tanzania. The organization focuses on training medical students to detect subclinical RHD using portable ultrasound devices, such as the GE Vscan and Butterfly iQ. Since its inception, Darul Qalb has trained over 250 medical students. I began volunteering with Darul Qalb in 2022 and took a lead role in organizing a training session on detecting RHD in May 2023.

Training Session at Karachi Medical and Dental College

On May 12, 2023, Darul Qalb, in collaboration with HOPES, a

student-run welfare organization at Karachi Medical and Dental College, conducted a free of cost training session for third, fourth and final year medical students. This session was led by Dr. Ahmad Akhtar, who provided hands-on training in performing ultrasound examinations of the heart using advanced devices such as the GE Vscan and Butterfly iQ. During this session, Dr. Akhtar introduced us to the Point-of-Care Ultrasound (POCUS) technique, an essential method for assessing heart valve changes that may indicate subclinical RHD. The training session had a duration of 2 hours and was intensive, allowing students to engage in hands-on practice on human subjects as well as on heart models. The combination of hands-on practice and model-based learning was designed to ensure that students were adequately prepared to proceed with screening real patients for subclinical rheumatic heart disease (RHD) using advanced ultrasound technology. This comprehensive training aimed to bridge the gap between theoretical knowledge and practical application, giving me and other students the confidence and competence to move forward in a clinical setting.

Community Outreach and Screening Initiative

Following the training, our team initiated a community outreach program to screen children for subclinical RHD. We set up ultrasound stations and conducted examinations on children, applying the skills acquired during our training. Experienced mentor, Dr. Ahmad Akhtar who is a trained doctor from the United States was on hand to guide and supervise us as we performed cardiac scans to detect potential abnormalities in the children's hearts for which Darul Qalb obtained an IRB approval from National Bioethics Committee. According to a study, the specificity of screening of patients with RHD are 90.2%. This stringent approach did not compromise sensitivity, which remained robust at 85.3% (95% CI: 78.0% - 90.9%). This suggests that the screening method is effective in accurately identifying true positive cases of RHD while minimising false positives.³

Impact and Reflection

This screening process was both educational and fulfilling. I was

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Layout Editor: Daniela Collazos

Submission: May 1, 2024
Revisions: Aug 9, 2024
Responses: Aug 18, 2024
Acceptance: Nov 13, 2024
Publication: Nov 19, 2024
Process: Peer-reviewed

This screening process was both educational and fulfilling. I was able to identify cases of subclinical RHD and refer them for further evaluation and treatment. The experience highlighted the critical role that early detection plays in improving children's lives and underscored the importance of community outreach in enhancing health outcomes.

Figure 1. Training Session on Rheumatic Heart Disease Detection at Karachi Medical and Dental College.



Legend: This figure depicts a training session conducted by Darul Qalb in collaboration with HOPES at Karachi Medical and Dental College on May 12, 2023. The session, led by Dr. Akhtar, provided hands-on training to medical students on the use of advanced portable ultrasound devices, such as the GE Vscan and Butterfly iQ, for the detection of subclinical Rheumatic Heart Disease (RHD). Students learned the Point-of-Care Ultrasound (POCUS) technique, which is crucial for assessing heart valve changes indicative of RHD. The image captures students actively engaging with the ultrasound technology under the guidance of experienced instructors, emphasizing the integration of medical education with practical skills in a low-resource setting.

Through this training and screening exercise, I gained invaluable skills in using advanced medical technology while contributing to a meaningful cause. Participating in this initiative not only improved my practical skills but also deepened my sense of responsibility and commitment to community health.

Community outreach programs, such as the screening for rheumatic heart disease (RHD) in low-income countries, are crucial for several reasons. Firstly, they enable early detection of RHD, a condition that often remains undiagnosed in these regions due to limited access to healthcare services. By identifying RHD at an early stage, these programs help in preventing the progression of the disease, which can lead to

severe heart damage and even death. Secondly, outreach programs bring essential healthcare services directly to underserved populations, overcoming barriers such as distance, cost, and lack of awareness. This approach not only improves health outcomes but also raises awareness about RHD, contributing to better prevention and management of the disease. Lastly, by involving local communities and healthcare providers, these programs help build local capacity, ensuring that the impact of the intervention is sustainable over the long term. In essence, community outreach programs are vital in addressing healthcare disparities and improving cardiovascular health in low-income countries.⁴

Figure 2. Community Screening Initiative for Subclinical Rheumatic Heart Disease.



Legend: This figure illustrates the community outreach initiative that followed the training session, where medical students applied their newly acquired ultrasound skills to screen children for subclinical Rheumatic Heart Disease (RHD). The screening took place in a local community setting, where ultrasound stations were set up to facilitate the examination of children's hearts. The image shows students performing cardiac scans while being supervised by mentors, highlighting the practical application of their training.

Summary – Accelerating Translation

Rheumatic Heart Disease (RHD) is a chronic condition resulting from untreated streptococcal throat infections that lead to rheumatic fever, primarily affecting heart valves. RHD remains prevalent in low-income countries like Pakistan, where it significantly contributes to cardiovascular deaths in children and young adults. This study focused on training medical students to use portable ultrasound devices to detect subclinical RHD in children, enabling early diagnosis and treatment.

In collaboration with Darul Qalb and HOPES, a training session was held at Karachi Medical and Dental College. Medical students received hands-on training in utilizing portable ultrasound devices such as the GE Vscan and Butterfly iQ to identify heart valve abnormalities related to subclinical RHD. The training covered the Point-of-Care Ultrasound (POCUS) technique for assessing heart conditions.

The early detection of RHD through portable ultrasound devices in community outreach programs can help prevent the progression of the disease. Moreover, training medical students not only enhances their diagnostic skills but also contributes to improving cardiovascular health outcomes in low-income regions.

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Acknowledgments

The author acknowledges Dr. Ahmad Akhtar, director of research at Darul Qalb. The author also acknowledges HOPES organization. For the ultrasound devices, EkO company is acknowledged.

Conflict of Interest Statement & Funding

The Authors have no funding, financial relationships or conflicts of interest to disclose.

Author Contributions

AZ: conceptualization, writing original draft, writing- reviewing and editing.

Cite as

Zaheer A, Combating Rheumatic Heart Disease in Pakistan: An Experience of Training, Screening and Community Outreach. *Int J Med Stud*. 2025 Jan-Mar;13(1):100-102.

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ISSN 2076-6327

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