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Perspective Piece

Transfusion Transmitted Infections: A Present-Day Danger for Pakistan

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Abstract. Over 1.5 million units of blood are collected in Pakistan each year, with around 65% of this donation coming from replacement donors—relatives or close friends of the affected who willingly donate blood to support the patient. Although blood transfusion is a life-saving therapy, it also involves the danger of spreading blood-borne illnesses if not appropriately screened. It has been extensively discussed that the precise number of transfusion transmitted infections (TTIs) in the Pakistani population is still unclear, and the estimates reported by the Sindh Blood Transfusion Authority may be a major underestimation because of the country's lack of inexpensive and effective screening tests. Regular blood transfusions are the mainstay of treatment of patients with blood diseases such as thalassemia and anemia. They are also commonly used to handle acute injuries, surgery, bleeding, and birthing difficulties. However, the risk of getting a TTI results in an increased hesitancy among blood transfusion recipients. Hence, to reduce the occurrence of TTIs, effective and vigorous measures must be implemented.

INTRODUCTION

According to the WHO, around 118.4 million blood donations are collected globally, with low-and-middle-income countries (LMICs) making 60% of the total contribution.[1] Although blood transfusion is a life-saving procedure, it carries with itself the risk of transmitting blood-borne diseases if not properly screened. Therefore, donated blood is tested for transfusion transmitted infections (TTIs), mainly HIV, syphilis, hepatitis B virus (HBV), hepatitis C virus (HCV), and malaria, before being made available for use.

In Pakistan, more than 1.5 million units of blood is collected each year, with over 65% of this donation coming from replacement donors, that is, family or close friends of the affected who voluntarily donate blood to help the patient.[2] In a recent report by Sindh Blood Transfusion Authority (SBTA), it was found that around 5% of blood donors in Sindh—the second most populated province of the country—are infected with one or more of the five different TTIs. Additionally, it was revealed that a majority of these donors were infected with HBV and/or HCV, whereas a relatively lower percentage were found to be HIV-positive.[3] These findings corroborate with published data collected from Karachi—the largest metropolitan city of Pakistan, that reports an overall percentage prevalence of TTIs in Sindh to be around 5.8%.[4] Moreover, previously reported data from major cities of Punjab and Khyber Pakhtunkhwa (KPK) has also shown a very high prevalence of TTIs in the country, highlighting the severity of this preexisting issue in the Pakistani population. In particular, the seroprevalences of HBV and HCV were high overall. This is because of multiple risk factors: improper sterilization of therapeutic injections and other invasive medical devices, unsafe blood transfusions, reuse of syringes, sharing of razors while getting a haircut, intravenous drug abuse, and ear/nose piercings.[5] However, HIV has been reported to be the least prevalent TTI across the country. Low surveillance, underreporting because of social stigma, and the protective effects of circumcision against sexually transmitted diseases remain the major contributors to these low figures.[6] Pakistan uses WHO-recommended screening guidelines to screen blood for TTIs. Techniques such as Chemiluminescent Microparticle Immunoassay (CMIA) and/or ELISA are used to check for hepatitis B surface antigen (HBsAg), anti-HCV antibodies, anti-HIV-1 and anti-HIV-2, and *Treponema pallidum* antibodies. Malaria antigen is detected using Immunochromatographic Technique (ICT) (Table 1).

Furthermore, the accurate figures of TTIs in the Pakistani population still remain unknown. Moreover, the recently reported prevalences by SBTA may in fact be just a gross underestimation, owing to the nationwide unavailability of affordable and accurate screening tests. This not only highlights the failure of our healthcare system to adopt effective screening strategies throughout the country, but it also leads to severe consequences for the patients, their families, and the entire community at large. There have also been arguments that since the blood donor population in Pakistan mainly comprises young or middle-aged males, the overall reported prevalence of TTIs may not accurately represent the actual prevalence in the country's general population.[4]

IMPLICATIONS

Pakistan has one of the highest prevalence of HBV and HCV (5 and 10 million, respectively) globally. At present, malaria is endemic in the region, with 3.5 million cases reported every year.[11] The unsafe blood transfusion practices resulting in transmission of infected blood are further fueling these numbers. A recent systematic review by Ehsan et al. reports that the seroprevalences of HBV and HCV among the blood donor population of Pakistan were 2.04% and 2.44%, respectively, and 70% of all donors who tested positive for TTIs had a history of blood donations. Furthermore, the studies included in this review that had a large number of replacement donors reported a higher prevalence of TTIs when compared with the studies with a high number of voluntary nonremunerated donations (VNRDs).[11] Moreover, there have been recent reports of isolated low-scale epidemics

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TABLE 1
Prevalence of TTIs in blood donors from five major cities of Pakistan[4,7–10]

City, province	Duration of study	Prevalence of TTIs (%)					Screening techniques
		Hepatitis B	Hepatitis C	HIV	Syphilis	Malaria	
Karachi, Sindh	2013–2015	1.84	1.70	0.04	2.10	0.07	CMIA, ICT (malaria)
Islamabad, Punjab	2010–2011	3.91	8.34	0.00	0.89	1.20	ELISA, RPR (syphilis), ICT (malaria)
Lahore, Punjab	2012–2016	0.90	1.70	0.00	1.10	0.10	ICT
Faisalabad, Punjab	2018–2019	1.12	3.24	0.18	1.10	0.89	CLIA
Peshawar, Khyber Pakhtunkhwa	2020	1.97	1.56	0.21	0.81	0.03	CLIA, ICT (malaria)

CLIA = chemiluminescent immunoassay; CMIA = chemiluminescent microparticle immunoassay; ICT = immunochromatographic technique; RPR = rapid plasma reagin; TTIs = transfusion transmitted infections.

of HIV in rural areas of Pakistan, and a systematic review by Rabold et al. has identified iatrogenic transmission, such as unsafe blood transfusions and reuse of medical equipment like syringes, as the primary contributing risk factor for the spread of HIV in the country.[12]

Regular blood transfusions are the mainstay of treatment of patients with blood disorders such as thalassemia and anemia, and are also widely used for the management of acute trauma, surgeries, hemorrhage, and complications related to childbirth.[11] According to recent statistics, Pakistan has one of the highest maternal mortality rates in the world,[13] and like all LMICs, injuries and trauma are a major cause of mortality and morbidity in this region.[14] In such cases, blood transfusions are urgently needed, or death usually results from heavy blood loss. It can rightly be assumed that an increase in the prevalence of TTIs can deter individuals from receiving blood transfusions, potentially increasing mortality for transfusion-dependent diseases.

Furthermore, the voluntary blood donation practice is already suboptimal or below a level that is sufficient to meet transfusion demand in Pakistan, and the country is mainly dependent on replacement donors. This greatly contrasts with WHO guidelines that strongly recommend the collection of blood exclusively from VNRDs to enhance donor–recipient safety and establish a sustainable system for blood supply that helps shift the burden from families to healthcare facilities.[15] The rise in TTIs can aggravate fear and hesitancy among the general population regarding blood donations, thus leading to a further decline in VNRDs.

Pakistan bears a double burden of disease with noncommunicable diseases making up about 48% of its total disease burden.[15] With the country's already overburdened healthcare system, increasing morbidity and mortality related to blood transfusions can be a huge liability. Contracting a TTI can be a dreadful experience for the transfusion recipient at an individualistic level. This is primarily because of the lack of awareness about these diseases and the stigmas surrounding them that may result in either hesitancy to seek and/or provision of adequate care and support to the affected. Additionally, the disease manifestations create an unnecessary and extreme physical and financial toll on the affected and their families. On a national level, the rise in TTIs unmasks the poor blood transfusion system, raising concerns over the quality of healthcare provided to the masses. It also places significant pressure on the state's already overburdened healthcare budget, as officials are tasked with delivering high-quality screening kits and diagnostic equipment to healthcare facilities and blood banks across the country.

CHALLENGES FACED AND EFFORTS MADE BY PAKISTAN

Being a low resource country, Pakistan experiences several major challenges in stopping the transmission of TTIs. These include a lack of WHO-recommended quality-assured serological screening process, trained staff who can effectively screen donors for high-risk behaviors, and donor's knowledge related to health and medical problems. Additionally, the high costs of screening tests and a lack of access to reliable healthcare facilities serve as major deterrents for the donor population, making it almost impossible to identify the prevalence of transfusion-related infections in the country.

Furthermore, the unavailability of a State-run, single online reporting system for epidemiological data, lack of follow-up services for donors and recipients, and suboptimal donor testing has limited our data on TTIs, ultimately leading to the failure of hemovigilance systems in the country. Poor screening and/or surveillance strategies add to the increase in the number of people affected with TTIs. This is because a huge population of people who might have contracted the disease remain ignorant to symptoms that manifest, thereby potentially putting themselves and their families at risk. These individuals may not take necessary precautions while indulging in activities such as shaving, sexual intercourse, tattooing, nail cutting, and blood donation, resulting in an even greater spread of TTIs.

With the COVID-19 pandemic overburdening the healthcare system, dealing with the increased number of TTIs has been unsatisfactory. Recent outbreaks of other severe infectious illnesses in Pakistan, such as dengue, measles, and cutaneous mucormycosis, have also added to the concern.[16–18]

Pakistan has made several notable attempts to address this challenge in the past years. In 2010, the "Safe Blood Transfusion Program" was launched by Pakistan to develop a new blood transfusion system following WHO guidelines. Under this program, 10 modern regional blood centers were established, and 60 existing hospital blood banks were completed. Furthermore, Pakistan has also received blood-screening kits worth $8.4 million from WHO via the U.S. Agency for International Development (USAID) program.[19] Although these developments have led to certain improvements, such as the creation of improved blood centers that strictly implement universal screening guidelines, they still suffer from a limited reach because of their concentration in mainly urban areas.

ACTION PLAN AND RECOMMENDATIONS

Blood transfusion is an important constituent of the model list of essential medicines by WHO.[15] A significant reduction

in transfusion-associated infectious risk is critical if blood is used as an essential therapy. This entails developing and implementing widespread, easy-access, and reliable screening practices.

Particular emphasis should be placed on the training and education of staff at blood collection centers regarding infection prevention and control practices. To achieve this, knowledge regarding the use of antiseptics for disinfection of patients' skin and materials such as tourniquets, scissors, and specimen carriers should be made familiar. The staff should also be adequately trained to dispose the used medical equipment properly and one-handed needle capping to avoid prick injuries. Additionally, all medical personnel should acquaint themselves with the appropriate use of personal protective equipment to maximally reduce risks of infecting themselves or the patients. Furthermore, these staff training programs should also involve teaching them history taking and good interpersonal skills for an effective initial risk-behavior donor screening. Proper history taking helps identify high-risk patients which saves time, effort, and money as these patients are filtered initially and deferred from donation.

The government should allocate a more substantial budget for the healthcare sector so that state-of-the-art medical equipment can be imported and brought to use for the public. Nucleic Acid Amplification Test with 99% accuracy should be made readily available to healthcare facilities and blood banks throughout the nation for effective blood screening.[20]

Moreover, there is a significant need to promote a culture of voluntary blood donations. To achieve this, community-wide campaigns and awareness programs need to be conducted that educate the masses regarding the importance of blood transfusion and the spread of blood-borne diseases. Additionally, free of cost, regular screening camps in combination with donation drives should be set up in remote areas. These camps should focus on donor education and registration in a voluntary donor base to ensure a sustainable supply of safe blood. Furthermore, media should be encouraged to run infomercials and programs that motivate the masses to participate in blood donation activities and dispel myths surrounding TTIs, helping beat their stigma. Donor awareness campaigns and public awareness campaigns should be regularly conducted, especially in rural areas of the country, to help alleviate misconceptions surrounding blood transfusion practices and encourage healthy individuals to voluntarily donate blood every 6 months.

Since proper transfusion of blood and its components is highly significant and requires great expertise, a special discipline of medicine called "Transfusion Medicine" has now evolved. The WHO recommends the integration of this subspecialty in the current academic curriculum for medicine.[21] In accordance with this, Pakistan should work toward the establishment of training programs in the country for Transfusion Medicine. This will, in the future, provide the country with a skilled workforce that is better equipped to establish safe blood transfusion practices.

Lastly, there is an imminent need for extensive epidemiological studies in the country to understand better the burden of TTIs, their risk factors, the impact of screening procedures, and the reasons for the failure of existing policies. For this, researchers should be mobilized country-wide and sent to remote areas with security for data collection.

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