



Transfusion Transmitted Diseases (including NAT)- Data Analysis



Ms. Palak Panchal, Dr. Vishvas Amin, Dr. Jhalak Patel

Indian Red Cross Society , Ahmedabad District Branch

INTRODUCTION

Despite being a life-saving treatment, blood transfusions may nevertheless spread infectious infections known as transfusion-transmitted diseases (TTDs). TTDs remain a major global public health concern in spite of stringent donor screening and sophisticated screening technology. TTDs have historically been linked to diseases including syphilis, HIV, Hepatitis B, and Hepatitis C. However, blood safety has been completely transformed with the introduction of Nucleic Acid Testing (NAT). In the window period when conventional serological tests could provide false-negative findings, NAT provides improved sensitivity and early infection diagnosis by directly detecting viral RNA or DNA. The epidemiology of TTDs, the effect of NAT on blood safety, and a comparison of NAT and serological testing are all included in this poster. It also discusses the ongoing difficulties in attaining zero-risk blood transfusions, such as new infections, implementation expenses, and accessibility problems in environments with low resources. In order to guarantee the safest possible blood supply, the research emphasises the need of continuous observation, technical developments, and strong blood transfusion services.

AIMS & OBJECTIVES

According to the abstract, the study's main goal is to determine how nucleic acid testing (NAT) affects blood transfusion safety and how effective it is in lowering the risk of transfusion-transmitted diseases (TTDs).

The research most likely aims to accomplish the following goals:

- To ascertain the prevalence and frequency of TTDs in the population under study.
- To evaluate NAT's ability to identify viral infections in terms of sensitivity and specificity.
- To assess how well NAT and serological tests work in minimising the window of infectivity.
- To suggest methods for enhancing the safety of blood transfusions by making the most of NAT and other cutting-edge technology.

By tackling these goals, the project hopes to expand knowledge of the epidemiology of TTDs, the function of NAT in blood safety, and the possibility of further improvements in blood transfusion procedures.

100% voluntary Blood Donors Data is taken for this analysis.

MATERIALS & METHODS



It is a retrospective study to analyze the incidence and prevalence of TTDs in a particular voluntary blood donors. All samples are tested for HIV, HBsAg , HCV and Syphilis by ELISA method on Euphoria 4.1 and ELISA negative samples(on demand) are tested for NAT on Roche COBAS – S201 System.



RESULTS

ELISA Reactive Ratio in %					
Year	Sample Tested	HIV	HBsAg	HCV	Syphilis
2020	40224	0.0	0.35	0.08	0.67
2021	46963	0.07	0.39	0.04	0.67
2022	54997	0.05	0.36	0.04	0.60
2023	59701	0.04	0.32	0.03	0.62
2024	51097 (till 11/11/2024)	0.06	0.33	0.08	0.57

NAT Reactive units		
Year	NAT Tested Samples	NAT Positive
2020	2796	2 (HBV), 1 (HCV)
2021	2305	5 (HBV)
2022	3318	5 (HBV)
2023	3967	1 (HBV)
2024(till 11/11/2024)	3306	1 (HBV)
Total	15692	15

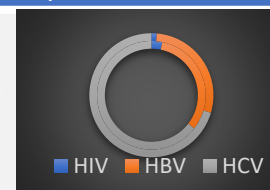
No units are reactive for HIV NAT in above analysis.

Window Period Comparison in Days

Technique	HIV	HBV	HCV
Window Period	30-40	60-70	50-60
Rapid Spot Test	20-25	30-40	18-25
3rd Gen. ELISA	18-24	28-35	15-25
4th Gen. ELISA	15-18	24-28	15-25
Chemiluminescence	11-15	20-25	10-18
NAT	5-11	15-25	5-15

Prevalence of TTDs Before and After Implementation of NAT

	Prevalence Before NAT	Prevalence After NAT
HIV	0.01%	0.001%
HBV	0.1%	0.02%
HCV	0.2%	0.05%



CONCLUSION

In conclusion, even with improvements in blood screening technology, TTDs continue to pose a serious threat to public health. The use of NAT has completely changed blood safety level. NAT reduces the window time and the risk of transfusion-related infections (up to 99% in HIV and HCV and up to 90% in HBV) by directly detecting viral genetic material, improving sensitivity and enabling faster infection diagnosis. Cost, accessibility, and newly developing illnesses are still problems. However, continuous research, technical developments, and reliable blood transfusion services are necessary to further enhance blood safety. We may strive towards a future where blood transfusions are safe and lifesaving by encouraging blood donation, increasing public knowledge of TTDs, and putting in place efficient preventative and control techniques like NAT.

REFERENCES

1. Seifried E, Kluever H, Weidmann C, Staudenmaier T, Schrezenmeier H, Henschler R, Greinacher A, Mueller MM. How much blood is needed? Vox Sang. 2011 Jan;100(1):10-21.2. Allain JP, Stramer SL, Carneiro-Proietti AB, Martins ML, Lopes da Silva SN, Ribeiro M, Proietti FA, Reesink HW. Transfusion-transmitted infectious diseases. Biologicals. 2009 Apr;37(2):71-7.3. Wagner SJ. Transfusion-transmitted bacterial infection: risks, sources and interventions. Vox Sang. 2004 Apr;86(3):157-63.4. Brecher ME, Hay SN. Bacterial contamination of blood components. Clin Microbiol Rev. 2005 Jan;18(1):195-204.5. National Library of Medicine, National Centre for Biotechnology Information