An international survey on measures to prevent transfusion-transmitted infectious diseases; study results 2: testing and donor vigilance

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Highlights:

- An international survey on measures to prevent transfusion-transmitted infectious disease (TTID) was conducted; specific TTID testing practices and associated donor actions (vigilance) were analyzed in relation to country/region (C/R) World Bank Income level.
- All reporting countries/regions required serologic screening for HIV, HBV, and HCV; syphilis screening was nearly universal; and almost all used some type of confirmatory testing, commonly with the same screening test. Hepatits E virus (HEV) and human T-cell lymphotrophic virus (HTLV) screening (universal or selective) were required mostly in high-income C/Rs. Additional use of nucleic acid testing was less common in low and lower middle-income C/Rs.
- All reporting C/Rs provided educational materials to donors, and practiced deferral and notification of donors based on positive/reactive TTID test results.

Abstract (248 words)

Background and Objectives

The results of a global survey on blood safety measures to prevent transfusion-transmitted infectious diseases (TTIDs) were analyzed focusing on TTID testing requirements, practices, and associated donor actions (vigilance).

Materials and Methods

Responses by country/region (C/R) were categorized by World Bank Income levels: Low and Lower Middle-Income (LLMI), Upper Middle-Income (UMI), and High-Income (HI). Consensus responses were used for C/Rs with multiple survey responses. Regions within China and India were analyzed separately. Survey questions on TTID testing and donor vigilance were compared across WBI levels.

Results

Responses from 74 C/Rs representing 65 countries and Hong Kong were analyzed. All C/Rs reported mandatory HIV, HBV, and HCV screening, with a few exceptions for syphilis. Most testing standards were set by national law, using antibody and/or antigen testing for HIV, HBV, and HCV; antibody testing was common for syphilis. NAT was less common in LLMI than in UMI and HI C/Rs. Confirmatory testing was reported by almost all (96%) C/Rs, often using the same screening test. All C/Rs provided educational material to donors and deferred/notified donors based on reactive/positive TTID results. Most C/Rs reported reactive/positive results to a central entity, and 89% withdrew and destroyed in-date units from previous collections.

Conclusion

All reporting C/Rs screened for HIV, HBV, and HCV, with most using confirmatory testing. Advanced testing like NAT was less common in LLMI C/Rs. Donor vigilance was consistent across income groups, with education, notification, and deferral for TTID results, and most reporting withdrawal/destruction of previous collections.

Keywords: Global Blood Safety, Infectious Disease Testing, Blood Donor Vigilance

Introduction:

Testing blood and blood products for transfusion-transmissible infectious disease (TTID) agents is the mainstay of donor and recipient safety. Vigilance is also essential in maintaining a safe blood supply broadly including donor education, risk-based deferrals, reactive/positive test result donor notification, recipient notification/tracing and surveillance for known and emerging infectious disease agents. The World Health Organization (WHO) recommends that all blood products be screened for TTIDs prior to use including mandatory testing for human immunodeficiency virus (HIV), hepatitis B (HBV), hepatitis C (HCV) and syphilis.[1] The WHO also publishes status reports using the Global Database on Blood Safety that includes information on TTID testing by country.[2,3] Independent from WHO efforts, the Subgroup on Harmonization of Regulations and Standards (Harmonization Subgroup) of the International Society of Blood Transfusion (ISBT) Working Party for Global Blood Safety (GBS WP) developed a survey to further assess global blood safety as it pertains to all aspects of TTIDs including policy, regulation, donation testing, and aspects of vigilance. The survey was distributed in 2023 and 2024 and included responses from ISBT members via an online survey and non-members via targeted emails. This analysis focuses on the TTID testing and donor vigilance aspects of the survey as analyzed by the country or regional income level; the results of responses to questions about blood safety laws, regulations, standards and best practices were published separately.[4]

Materials and Methods:

In-depth details regarding the survey methods are included in the first publication (An international survey on the prevention of transfusion-transmitted infectious diseases; study results 1: participation rates and the presence of laws, regulations, standards and best practices)[4]. Briefly, data collection took place between October 2023 and March 2024 using the online platform Survey Monkey (San Mateo, California, USA). A copy of the full survey is included (Supplemental Appendix). All ISBT members were invited to respond to the survey and share it with blood collection organization representatives from other countries; separate targeted email invitations were also included with the goal of increasing participation particularly from Latin America and Africa.

Responses were categorized by World Bank Income (WBI) group: Low and Lower Middle-Income (LLMI – a combination due to low response rate in Low-Income countries), Upper Middle-Income (UMI), and High-Income (HI) based on country or territory of origin.[5] Cities, provinces, and states (regions) within China and India were categorized as separate regions for analysis. A consensus response was used for countries/regions (C/Rs) with multiple survey responses by taking all individual responses from given C/Rs and combining them into a single response. Consensus responses included the majority for single option questions (if tied, responses indicating the use of specific testing or vigilance practices were assigned to the C/R's consensus response) and all individual responses for multiple response questions. Survey responses were compared (qualitative proportions) between the three WBI categories using SAS version 9.4 (SAS Institute, Cary, NC).

Results:

Responses from 131 individuals representing 65 countries plus, separately, Hong Kong (or 74 C/Rs total when all individual consensus responses were assembled)[4] were analyzed (Figure 1). All C/Rs reported mandatory screening for HIV, HBV and HCV (Table 1). All reported mandatory syphilis screening except Denmark (where no testing occurs) and Norway (where selective testing occurs for new donors only). HI C/Rs had the highest proportion (10/33; 30%) of required hepatitis E virus (HEV) screening compared to only 1 LLMI C/R with required HEV screening (Nigeria), and 1 UMI C/R using selective testing based on residence (Mexico). Human T-cell lymphotropic virus (HTLV) screening rates were also highest among HI C/Rs (15/33; 45% requiring testing) followed by 5/18 (28%) of UMI C/Rs requiring testing and only 1/23 LLMI C/Rs (Iran) performing selective screening based only on donor residence. Variable percentages of HI C/Rs reported voluntary or selective HEV and/or HTLV screening with one-time (1x) HTLV screening for 27% of HI C/Rs. A requirement for *Plasmodium* screening was most common in LLMI C/Rs (39%), with UMI and HI C/Rs reporting more selective screening methods used (i.e., 33% and 52% in HI C/Rs reported testing based on residence or following travel, respectively, versus 22% in UMI C/Rs for both). Furthermore, UMI and HI C/Rs were more likely to defer donors without testing based on their recent travel

(78% and 73% in UMI and HI, respectively), whereas only 35% of LLMI C/Rs reported this practice. UMI C/Rs had the highest proportion of any Chagas testing (22%), but HI C/Rs had the highest proportion of a travel-based Chagas deferrals without performing routine testing (18%). HI C/Rs reported 73% travel-based deferrals without routine screening for dengue and West Nile viruses; LLMI and UMI C/Rs reported between 33-48% for these arboviruses.

When queried about best practices for the selection and routine use of TTID test kits, 39% of LLMI, 56% of UMI and 42% of HI C/Rs indicated these are established by professional associations/societies (Table 2). Screening standards for HIV, HBV, HCV, and syphilis were reported as required by national law for 88-97% C/Rs across all WBI categories. Data in Table 2 were presented as ranges since the data represent all four disease agents.

The second highest category after national law for establishing screening standards was by national blood systems in LLMI and UMI C/Rs (44-65%), recognizing that in many cases both national law and requirements set by national blood systems apply.

For screening purposes, 100% of C/Rs reported antibody testing for HIV and HCV, and almost all (89-100%) reported antigen testing for HBV (i.e., HBsAg) (Table 3). Across all C/Rs, nearly 50% (43-56% varying by WBI level) reported additional anti-HBc testing. Nearly all C/Rs reported using antibody testing for syphilis (LLMI at 83% and UMI at 100%). Rapid tests were reported by all income levels, with the highest use reported among LLMI C/Rs for syphilis (30%). HI C/Rs had the highest reported use of nucleic acid testing (NAT) for HIV, HBV and HCV (91%) (C/Rs indicating non-usage were Chile, Norway, and Romania), followed closely by UMI C/Rs (89%) (C/Rs indicating non-usage were Iraq and Peru), with far lower percentages for LLMI C/Rs (22%) (C/Rs indicating usage were Egypt, the Indian city of Delhi, and the Indian states of Maharashtra, Uttarakhand, and Uttar Pradesh). HEV testing, where performed, was always by NAT.

All HI, all except two UMI C/R (Paraguay and Russia) and one LLMI C/R (Burundi) reported confirming reactive screening results (70/73 or 96%; Table 4). Among those that use confirmatory testing for HIV, HBV, and HCV, all LLMI C/Rs, most UMI C/Rs (88-94%) and fewer HI C/Rs (69-72%) used the same screening test for confirmation

(among a range of other less frequent methods). Use of NAT for confirmation of these agents was prevalent in both UMI C/Rs (69%) and HI C/Rs (69-72%) in addition to some using either neutralization or blot with or without other confirmatory methods tested in combination. Among those that used confirmatory testing for syphilis, most (91-100%), across all WBI categories, tested by the same screening assay with nearly half of HI C/Rs reporting using a blot and two countries (Switzerland and the United Arab Emirates) having reported using a syphilis NAT.

In the event of reactive screening tests for HIV, HBV, HCV, or syphilis 65/73 or 89% of C/Rs (94% of HI, 83% of UMI, and 87% of LLMI C/Rs) reported withdrawing and destroying the reactive unit along with any previous in-date units associated with the donor (Table 5). Of this subset of C/Rs, all notified recipients of prior units collected from a donor who had a reactive unit for HIV, HBV, and HCV. Variation across WBI groups was seen in the case of syphilis with recipient notification practiced more in LLMI C/Rs (95%) than in UMI C/Rs (87%) and HI C/Rs (70%) (exceptions are identified in the Table footnote). All C/Rs provided educational materials on risk factors to donors at the time of donation regarding self-deferral; and, all C/Rs deferred donors from future donations based on reactive/positive TTID test results. C/Rs were evenly split across WBI on whether donors were notified based on reactive screening or confirmatory results, with HI C/Rs slightly favoring notification based on specific confirmatory tests (59%) and LLMI C/Rs slightly favoring notification based on the original screening results (52%). Between 83% and 88% of responding C/Rs reported that the number and proportion of reactive/positive results were required to be reported to a central location, and 9-11% reported that this type of surveillance was voluntary.

Discussion:

This study highlights important details regarding TTID testing and donor vigilance throughout 74 C/Rs. All participating C/Rs reported HIV, HBV, and HCV testing, meeting the WHO minimum requirements for laboratory screening of blood.[1] All C/Rs except Denmark and Norway required syphilis testing for all donations, consistent with information on syphilis testing found in the 2021 WHO Global Status Report which also reported that Iceland does not test all donations for syphilis (Iceland did not respond to

the current study).[3] Norway does not test all donations for syphilis due to low population prevalence; exclusion of donors not feeling well, treponemal nonviability during “normal” storage, and the ability to treat incidental infections with antibotics are all cited as reasons for performing only selective testing.[6] Reasons are similar for Denmark and Iceland for not testing (Table 1). Testing of other TTIDs varied greatly by WBI, likely due to differences in endemicity, risk, and available resources. Required HEV testing (by NAT) was most common among HI C/Rs (30%) but by only two C/Rs in the other WBI groups (Nigeria and Brazil). HEV screening in HI C/Rs is likely driven by localized identified risk and available resources permitting the use of NAT. The 2021 WHO Global Status Report lists HEV donation testing only for France, Japan, Switzerland, and Luxembourg; however, the results of a survey conducted in 2019 from the ISBT WP on TTIDs found that 26% (11/43) of all respondents (skewing toward higher income countries) routinely screen using HEV NAT,[7] which is similar to the 10/33 (30%) reported among HI C/Rs here, noting that in UMI and LLMI C/Rs only 3/41 (7%) in total perform HEV NAT. Similarities of the TTID WP and the GBS WP survey presumably reflect overlap in the surveyed countries or regions. Similarly, HTLV universal serologic screening was common in HI C/Rs with 45% requiring screening followed by 28% of UMI C/Rs and no LLMI C/Rs (though one, namely Iran, did report selective testing based on residence). Findings regarding *Plasmodium* testing were similar to those reported by the WHO; testing all donations correlated with endemicity, whereas non-endemic countries (driven by HI C/Rs) tended to have either selective testing or a travel-based deferral.[3,8] Chagas testing was most common in UMI C/Rs, likely due to the high proportion of South and Central American countries represented in this group and their related endemicity of *Trypanosoma cruzi*.[9] Travel-based deferrals for Chagas, dengue virus, and West Nile virus were most common in HI C/Rs which aligns with the WHO report in which HI C/Rs had the highest average deferral rate for travel history compared to other income levels.[3]

Standards for HIV, HBV, HCV, and syphilis testing were mostly set by national law across all income levels, with HI C/Rs reporting the highest rates of requirement followed closely by UMI and then by LLMI C/Rs. In the sections of the survey focused on laws and regulations (published separately), there were high rates of national

regulation of blood products reported among all WBI categories, with the highest in HI C/Rs followed by UMI and then by LLMI C/Rs.[4] The very high proportion of requirements for TTID testing reported here across all WBI groups are similarly aligned presumably because requirements for screening all donations for HIV, HBV, HCV and syphilis are part of national regulations. The range of requirements provided in Table 2 indicates that best practices and standards by agent were similar, with a high level of consistency across the three WBI levels.

The current study confirms that NAT is widely used in UMI and HI C/Rs (89-91%), but implemented much less commonly in LLMI C/Rs (22%); this is an expected outcome due to relative access to resources. This particular trend with resource-limited implementation for advanced technology was also observed in the results of the policy, regulation, and processing portion of this survey, in which lower income C/Rs were less likely to utilize pathogen reduction, leukocyte reduction and bacterial testing of platelets.[4] In the WHO report, those who responded reported HIV and HCV antibody, and HBV antigen (HBsAg) screening with or without other testing; NAT usage was most common in Europe.[3] In Faddy et al., in addition to serology, 88% of respondents used HIV NAT and 84% used HCV and HBV NAT (of 43 respondents representing 32 countries), again corroborating the findings of our study.[7] Antibody tests were primarily reported for syphilis across all WBI levels; however, 30% of LLMI C/Rs reported using rapid tests, an expected finding for more resource-limited areas.[10] HIV, HBV, HCV, and syphilis confirmatory testing were common among all WBI groups, with repeating the initial screening test being reported the most frequently, especially for LLMI C/Rs, again likely due to resource limitations inhibiting the use of more expensive NAT and blot technologies. Utilization of confirmatory testing is not covered in the WHO report but was reported for NAT by the 2019 ISBT TTID WP survey for samples that were classified as NAT-only reactive (NAT-yield samples). In that survey, nearly all respondents (28/32) reported repeating NAT and performing serology using the same sample for confirmatory testing, with or without additional testing performed on a follow-up sample.[11]

There was little difference in donor vigilance among WBI categories. Even though most survey responders indicated withdrawing and destroying all units (current and prior in-date units) from a reactive donor, there were a few C/Rs across all WBI categories that did not. It should be noted that those responding “no” to this question likely withdraw and destroy the one reactive unit (and consequently were assumed to not retrieve prior in-date units or notify recipients). Of the C/Rs that did withdraw and destroy all prior in-date units from a reactive donor, all notified recipients of the removal of previous units. This practice aligns with another ISBT survey for which all responding C/Rs (N=16) indicated there was a donor triggered lookback (which includes recipient notification) for HIV, and mostly also for HBV and HCV.[12] Even though the basis for donor notification was divided between reactive screening versus confirmed reactive results, all responding C/Rs indicated that donors were notified of their result, aligning with a study on international donor notification showing that all participating countries (N=14) either had a policy requiring donors to be notified of reactive or positive results, or did not have an official policy but still notified donors.[13] The aforementioned study also covered the requirement to report reactive results to a public health agency as well as to a regional/national registry, for which responses showed great variability (questions allowed a free response), with many indicating a requirement to report reactive or positive test results, but few indicating a national, comprehensive registry. The current study showed that most responders (83-88% across WBI groups) did in fact have a requirement to report the number and proportion of donations or donors found to have a reactive or positive test result to a central entity.

Major limitations of this study have been discussed in the first publication of this survey’s results,[4] but briefly include: responses from a particular C/R may not necessarily represent the practices of the entire C/R, questions may not have been interpreted comparably by all respondents as the survey was conducted solely in English, and some responses were invalidated and removed from the analysis if deemed likely incorrect based on the authors’ knowledge of existing C/R practice. Lastly, responses from LLMI C/Rs likely reflect those that are able to be compliant with the WHO testing requirements; other LLMI C/Rs may not have responded affirmatively

due to their inability to meet the WHO requirements or answered in the affirmative as to their testing practices, yet did not consistently have the resources to do so.

This survey is one of the largest evaluations of global blood safety measures currently in-place, apart from WHO efforts. It provides a unique perspective relevant to income level and expands on the scope of other recent surveys. Notably, it provides an update and confirmation of key findings of the most recent WHO report,[3] which relied on data for 2018 and earlier. At the same time, information provided by ISBT member blood organizations appears to corroborate reporting that WHO received previously through national Ministries of Health. The findings from this survey indicate that basic WHO recommendations for HIV, HBV, HCV, and syphilis testing are still being met (with a few exceptions for syphilis). Differences observed by income level most often occurred with more resource-dependent technologies, such as NAT. Variability by WBI level in this, and part 1 of our reporting of survey results,[4] emphasize that the implementation and routine use of new technologies/markers (other than HIV, HBV, HCV, and syphilis serology) are dependent on available resources; each country must balance those with other regional/national priorities. Additional global blood safety efforts to prevent TTIDs should be focused on increasing cost-effective availability of more advanced technologies in low and lower-middle income countries.

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Figure 1. Participating country/region by World Bank Income level (n=74)*

*Of 217 countries/territories ranked using the World Bank Index, this survey represents 17/80=21.3% Low and lower middle-income countries (individual regions within India were counted as a single response), 16/54=29.6% upper middle-income countries (individual regions within China were counted as a single response), and 33/83=39.8% high-income countries (including Hong Kong as separate from China consistent with the World Bank classification). There were 16/54 countries from Africa, representing approximately 55% of the total population. Aruba, Curaçao, Hong Kong, and Singapore (not visible), categorized as high income.

Table 1: TTID testing and geographic-based deferral by agent and WBI level[1]

	Low & Lower Middle Income (N=23) N (% Yes)	Upper Middle Income (N=18) N (% Yes)	High Income (N=33) N (% Yes)
HIV, HBV, & HCV[2]			
All donations required	**23 (100%)[3]**	**18 (100%)**	**33 (100%)**
Syphilis			
All donations required	**23 (100%)**	**18 (100%)**	31 (94%)
Not tested	0 (0%)	0 (0%)	**1 (3%)[4]**
Selective testing based on 1x testing[5]	0 (0%)	0 (0%)	**1 (3%)[6]**
HEV			
All donations required	1 (4%)[7]	0 (0%)	**10 (30%)**
All donations voluntary	0 (0%)	0 (0%)	**3 (9%)**
Selective testing based on 1x testing[5]	0 (0%)	0 (0%)	**1 (3%)**
Selective testing based on residence	0 (0%)	**1 (6%)[8]**	0 (0%)
Selective testing (unspecified)	0 (0%)	0 (0%)	**1 (3%)**
HTLV			
All donations required	0 (0%)	5 (28%)	**15 (45%)**
All donations voluntary	0 (0%)	**1 (6%)**	**2 (6%)**
Selective testing based on travel	0 (0%)	0 (0%)	**1 (3%)**
Selective testing based on 1x testing[5]	0 (0%)	0 (0%)	**9 (27%)**
Selective testing based on residence	1 (4%)[9]	**4 (22%)**	3 (9%)
Plasmodium			
All donations required	**9 (39%)[10]**	1 (6%)[11]	1 (3%)[12]
All donations voluntary	1 (4%)	**1 (6%)**	0 (0%)
Selective testing based on travel	1 (4%)	4 (22%)	**17 (52%)**
Selective testing based on 1x testing[5]	1 (4%)	0 (0%)	**2 (6%)**
Selective testing based on residence	0 (0%)	4 (22%)	**11 (33%)**
Deferral based on travel/no routine testing	8 (35%)	**14 (78%)**	24 (73%)
Chagas			

Any testing[13]	0 (0%)	**4 (22%)**	4 (12%)
Deferral based on travel/no routine testing[14]	0 (0%)	2 (11%)	**6 (18%)**
Dengue Virus			
Deferral based on travel/no routine testing	11 (48%)	7 (39%)	**24 (73%)**
West Nile Virus			
Deferral based on travel/no routine testing	9 (39%)	6 (33%)	**24 (73%)**

[1]Respondents were allowed to select multiple options (if any) therefore columns may not add to 100%. [2]No response from Bhutan, therefore proportion was 22/22 for HCV. [3]Highest percentages across each category bolded. [4]Denmark. [5]Combined responses for selective testing based on a previous negative result or for new donors only. [6]Norway. [7]Nigeria. [8]Mexico. [9]Iran. [10]All seven states and cities in India, as well as Pakistan and Sri Lanka. [11]Brazil. [12]Saudi Arabia. [13]This response was taken from free responses to "Other" on the question asking "please indicate the condition(s) that applies to laboratory testing whether for all (universal) or some (selective) units of donated blood." [14]This response was taken from free responses to "Yes, other" on the question asking "Are there any TTID agents for which whole blood donors are deferred routinely for travel exposure but donations are not routinely tested?".

Table 2. Best practices and standards for TTID testing by WBI level

	Low & Lower Middle Income (N=23) N (% Yes)	Upper Middle Income (N=18) N (% Yes)	High Income (N=33) N (% Yes)
Do professional associations/societies establish best practices for the selection and routine use of TTID kits	9 (39%)	**10 (56%)[1]**	14 (42%)
Standards for HIV, HBV, HCV, and syphilis set by (multiple allowed):[2]			
National law	21 (91%)	17 (94%)	**28-31 (88-97%)[3,4]**
Professional organization	**7 (30%)**	5 (28%)	5 (16%)
Your blood center	**13 (57%)**	5 (28%)	9-10 (28-31%)
Voluntary	**2-3 (9-13%)**	0 (0%)	0-1 (0-3%)
National blood system	**15 (65%)**	8 (44%)	5-6 (16-19%)

[1]Highest percentages across each category bolded. [2]Data not available for Israel for this question. [3]Displayed as ranges since all four disease agents are displayed for each category. [4]Only syphilis was 88%, the other three agents were 97%.

Table 3. Screening methods for TTID agents by test method and WBI level

	Low & Lower Middle Income (N=23) N (% Yes)	Upper Middle Income (N=18) N (% Yes)	High Income (N=32)[1] N (% Yes)
Are test(s) for HIV performed by:			
Rapid tests	**4 (17%)[2]**	1 (6%)	0 (0%)
Lab-based antibody	**23 (100%)**	**18 (100%)**	**32 (100%)**
Lab-based antigen	**19 (83%)**	14 (78%)	23 (72%)
NAT	5 (22%)[3]	16 (89%)[4,5]	**29 (91%)[6,7]**
Are test(s) for HBV performed by:			
Rapid tests	**3 (13%)**	2 (11%)	0 (0%)
Lab-based antibody	10 (43%)	**10 (56%)**	15 (47%)
Lab-based antigen	**23 (100%)**	16 (89%)[8]	31 (97%)[9]
NAT	5 (22%)[3]	16 (89%)[4,5]	**29 (91%)[6,7]**
Are test(s) for HCV performed by:			
Rapid tests	**4 (17%)**	1 (6%)	0 (0%)
Lab-based antibody	**23 (100%)**	**18 (100%)**	**32 (100%)**
Lab-based antigen	**7 (30%)**	5 (28%)	3 (9%)
NAT	5 (22%)[3]	16 (89%)[4,5]	**29 (91%)[6,7]**
Are test(s) for Syphilis performed by:			
Rapid tests	**7 (30%)**	1 (6%)	1 (3%)[10]
Lab-based antibody	19 (83%)	**18 (100%)**	29 (91%)
Lab-based antigen	**6 (26%)**	4 (22%)	3 (9%)
NAT	1 (4%)[11]	**1 (6%)[12]**	1 (3%)[13]

[1]Data not available for Israel. [2]Highest percentages across each category bolded. [3]Egypt, Delhi, Maharashtra, Uttarakhand, and Uttar Pradesh. [4]Iraq and Peru did not indicate usage. [5]Argentina is counted as using HIV, HBV, and HCV NAT; however, not all provinces currently use NAT. [6]Chile, Norway, and Romania did not indicate usage. [7]Romania was counted as not using HIV, HBV, and HCV NAT screening since only 1 of 42 centers use NAT. [8]Mexico and Paraguay did not indicate usage. [9]Oman did not indicate usage. [10]US (Mayo Clinic). [11]Egypt. [12]Beijing. [13]United Arab Emirates.

Table 4. Confirmatory testing for TTIDs by agent and WBI level

	Low & Lower Middle Income (N=23) N (% Yes)	Upper Middle Income (N=18) N (% Yes)	High Income (N=32)[1] N (% Yes)
Are reactive tests confirmed with additional testing?	96% (22)[2]	89% (16)[3]	**100% (32)[4]**
Are reactive test(s) for HIV confirmed by:			
Same screening test	**22 (100%)**	14 (88%)	23 (72%)
Neutralization	0 (0%)	0 (0%)	**2 (6%)**
Blot	5 (23%)	11 (69%)	**27 (84%)**
NAT	5 (23%)	11 (69%)	**23 (72%)**
Are reactive test(s) for HBV confirmed by:			
Same screening test	**22 (100%)**	14 (88%)	22 (69%)
Neutralization	2 (9%)	7 (44%)	**20 (63%)**
Blot	**5 (23%)**	1 (6%)	3 (9%)
NAT	5 (23%)	**11 (69%)**	**22 (69%)**
Are reactive test(s) for HCV confirmed by:			
Same screening test	**22 (100%)**	15 (94%)	22 (69%)
Neutralization	**2 (9%)**	0 (0%)	1 (3%)
Blot	3 (14%)	5 (31%)	**24 (75%)**
NAT	4 (18%)	11 (69%)	**23 (72%)**
Are reactive test(s) for Syphilis confirmed by:			
Same screening test	21 (95%)	**16 (100%)**	29 (91%)
Neutralization	0 (0%)	0 (0%)	**1 (3%)**
Blot	0 (0%)	1 (6%)	**15 (47%)**
NAT	0 (0%)	**2 (13%)**[5]	2 (6%)[6]

[1]Data not available for Israel. [2]Burundi did not indicate using confirmatory testing. [3]Paraguay and Russia did not indicate using confirmatory testing. [4]Highest percentages across each category bolded. [5]Malaysia and Mexico. [6]Switzerland and United Arab Emirates.

Table 5: Reactions to TTID positive testing results and donor vigilance by WBI level

	Low & Lower Middle Income (N=23) N (% Yes)	Upper Middle Income (N=18) N (% Yes)	High Income (N=32)[1] N (% Yes)
In the event of a reactive screening test for HIV, HBV, HCV or syphilis, in addition to the current donation, are in-date units from the donor's previous collections withdrawn and destroyed[2]	20 (87%)[3]	15 (83%)[4]	**30 (94%)[5,6]**
If so, which TTID agents warrant notification to the recipients of previous units:[7,8]			
HIV recipient notification	**20 (100%)**	**15 (100%)**	**30 (100%)**
HBV recipient notification	**20 (100%)**	**15 (100%)**	**30 (100%)**
HCV recipient notification	**20 (100%)**	**15 (100%)**	**30 (100%)**
Syphilis recipient notification	**19 (95%)[9]**	13 (87%)[10]	21 (70%)[11]
Are donors provided educational materials for self-deferral?	**23 (100%)**	**18 (100%)**	**32 (100%)**
Are donors deferred based on reactive/positive test results?	**23 (100%)**	**18 (100%)**	**32 (100%)**
Are reactive donors notified based on reactive screening results?[12]	**12 (52%)**	9 (50%)	13 (41%)
Are reactive donor notified based only on confirmed positive results?[12]	11 (48%)	9 (50%)	**19 (59%)**
Are TTID reactive/positive results required to be reported centrally?[13]	20 (87%)	15 (83%)	**28 (88%)**
Are TTID reactive/positive results voluntarily reported centrally?[13]	2 (9%)	2 (11%)	**3 (9%)**

[1]Data not available for Israel. [2]Assumption for the question was that it applied to all agents for which screening is required, but the responses do not necessarily apply to all agents. [3]Ethiopia, Zambia, and Zimbabwe indicated they do not withdraw and destroy all in-date units from the donor's previous collections. [4]Botswana, Shanghai, and Thailand indicated they do not withdraw and destroy all in-date units from the donor's previous collections. [5]Oman and Switzerland indicated they do not withdraw and destroy all in-date units from the donor's previous collections. [6]Highest percentages across each category bolded. [7]TTID: transfusion-transmissible infectious disease. [8]Only countries/regions indicating that all in-date units are withdrawn and destroyed were allowed to respond to the recipient notification questions. [9]Iran indicated they do not notify recipients of a syphilis-positive donor's previous units. [10]Iraq and Namibia indicated they do not notify recipients of a syphilis-positive donor's previous units. [11]Austria, Denmark, Finland, Greece, Hong Kong, Norway, Poland, Saudi Arabia, and Singapore indicated they do not notify recipients of a syphilis-positive donor's previous units. [12]If any consensus country/region indicated that a confirmed positive result was needed for notification then that response was selected to represent the country/region. [13]If any consensus country/region indicated that TTID reporting was mandatory then that response was selected to represent the country/region.