Cost Utility Analysis Subgroup

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Cancun, Mexico
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Global risk assessment and cost utility of blood safety interventions – development of a web-based application and multi-country analysis framework

Subgroup meeting July 7, 2012

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- Reviewed the website
- Discussed the remaining tasks and problems
- Reviewed available use statistics
- Discussed new ideas

Web-Interface

http://bloodsafety.isbtweb.org/cua

- Development of the web-interface was sponsored by the ISBT TTID working party.
- Goal: make Cost-Utility analyses of blood screening interventions available to a wide audience without requiring expertise on model development and/or health economics.
- Blood screening strategies consist of:
  1) antibody assays (Abs) for HIV and HCV + HBV surface antigen (HBsAg),
  2) antibody assays that include antigens for the agents of interest (Combo tests),
  3) NAT in minipools of 6 donations (MP NAT), and
  4) individual donation (ID) NAT can be compared

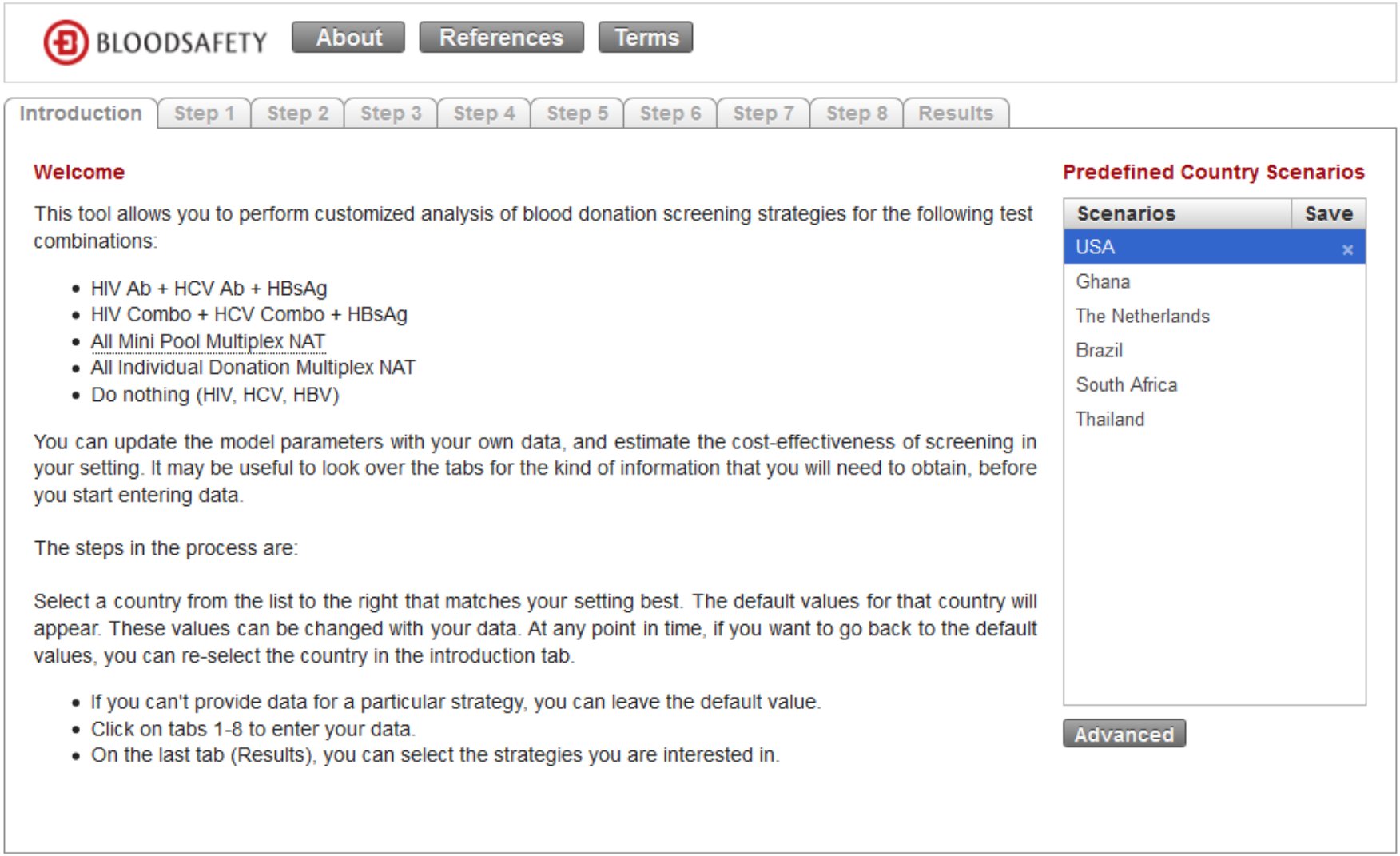
Web interface

http://bloodsafety.isbtweb.org/cua

- Country-specific data on the prevalence (and incidence where available) of each infection, percentage of first time and regular donors, cost of different testing methods, average age of transfusion recipients, transfusion survival and related parameters were used
- Results provided from the web-interface include the number infections interdicted using different ID screens, and as incremental cost per disability adjusted life year averted ($/DALY)
- The suggested UN/WHO threshold of three times the gross national income (GNI) per capita can be used to define which testing strategies can be classified as cost-effective
- Tool currently also accessible at:

https://interactive.basecase.com/anon.py?isbt-cua

Introduction page



Steps

1. Risk model and donor population
2. Recipient/patient epidemiology
3. Infectious window periods
4. Donor screening costs
5. Methodology (health economic factors)
6. HIV+ disease progression and treatment costs
7. HBV+ and HCV+ disease progression
8. HBV and HCV treatment costs

Results

Results options

1. Infections remaining, costs and DALYs
2. Incremental cost effectiveness ratios (ICERs)
3. Cost-effectiveness plane

Download report

Results
Infections, Costs and DALYs

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Select Strategies

Please select the screening strategies you would like to compare for your setting. Results can be viewed in three different ways by selecting the tab for ICERs, Cost-Effectiveness Plane, or Totals shown at right.

- [x] HIV Ab + HCV Ab + HBsAg
- [ ] HIV Combo + HCV Combo + HBsAg
- [x] All Mini Pool (x) Multiplex NAT
- [x] All Individual Donation Multiplex NAT
- [x] Do nothing (HIV, HCV, HBV)

Save your data

Save your data by clicking on the Save button below. After you have given your scenario a name, you can compare it to the predefined default scenarios.

Scenarios	Save
USA	
Ghana	

Results The results are presented in the 3 tabs below.

Infections remaining, Costs and DALYs | ICERs | Cost-Effectiveness Plane

Screening Strategies	HIV	HCV	HBV	Costs	DALYS
HIV Ab + HCV Ab + HBsAg	0.96	7.11	8.64	$11,989,826	11
	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
All Mini Pool (x) Multiplex NAT	0.41	0.77	5.59	$32,400,246	4
All Individual Donation Multiplex NAT	0.26	0.60	4.64	$41,930,209	3
Do nothing (HIV, HCV, HBV)	41.08	477.36	246.38	$3,718,395	493

DALYs- Disability Adjusted Life Years

The sum of years of potential life lost due to prematuremortality and the years of productive life lost due to disability.More information on the WHO website

Results for six countries

Country	Abs+ HBsAg*	Combo+ HBsAg*	Minipool NAT*	Individual Donation NAT*	UN/WHO Threshold (3xNGI)
Brazil	Dominant	Dominant	299,300	1,254,000	22,050
Ghana	Dominant	608	1,762	4,896	2,010
South Africa	Dominant	Dominant	Not Applicable	174,700	17,334
Thailand	Dominant	5,291	15,840	52,191	8,520
The Netherlands	Dominant	4,833,442	6,600,446	93,453,997	150,450
USA	17,100	Not Applicable	2,934,000	24,729,000	144,669

*Anti-HIV, Anti-HCV, and HBsAg are compared to no intervention and then each intervention set is compared incrementally to the intervention set to the left. Combo means combined antibody and antigen assays. Not applicable means the testing strategy is not available in the country.

Website use in the last year

- No formal registrations for the tool - all the logins to the tool were anonymous

- Users only have to register if they want to save their data (create a new scenario that gets saved to the server)
  - People could have downloaded the report, but we cannot track this
  - Of the total 92 accesses, all ran one or more simulations, by entering new data or adjusting values in 6 countries.

Current issues

Web site unavailable for a few months due to a web address change at ISBT

http://bloodsafety.isbt-web.org/cua

http://bloodsafety.isbtweb.org/cua

Tracing model and web interface problem

- We are still struggling with a bug that was reported by Bio-Rad
- Aberrant results when using the tool
- Is this a result of the underlying model or a web interface

Completion of manuscript

Focus on 6 countries

- Attempts to include other countries were not successful
- Face validity to be established by comparing results to published studies for the Netherlands and the USA
- Primary route for increasing knowledge and use of the tool

Updates on project

Primary problem is outreach to facilitate use of the tool

- Need to work with TTID members to facilitate wider use
- Need to find ways to present/promote to wider audiences
- Submission of manuscript will be key to the enhancing knowledge of the project

New ideas

How complex does a CUA analysis have to be?

- Is the current tool too complex
- Simplified model
  - Can the core parameters necessary for an ‘order of magnitude’ assessment of cost-utility be developed?

New ideas

International Forum

Topic: Use of health economics and cost-utility studies in blood safety decision making

- Different stakeholders will have different positions

- Goal: Understand the breadth of opinions

Acknowledgements

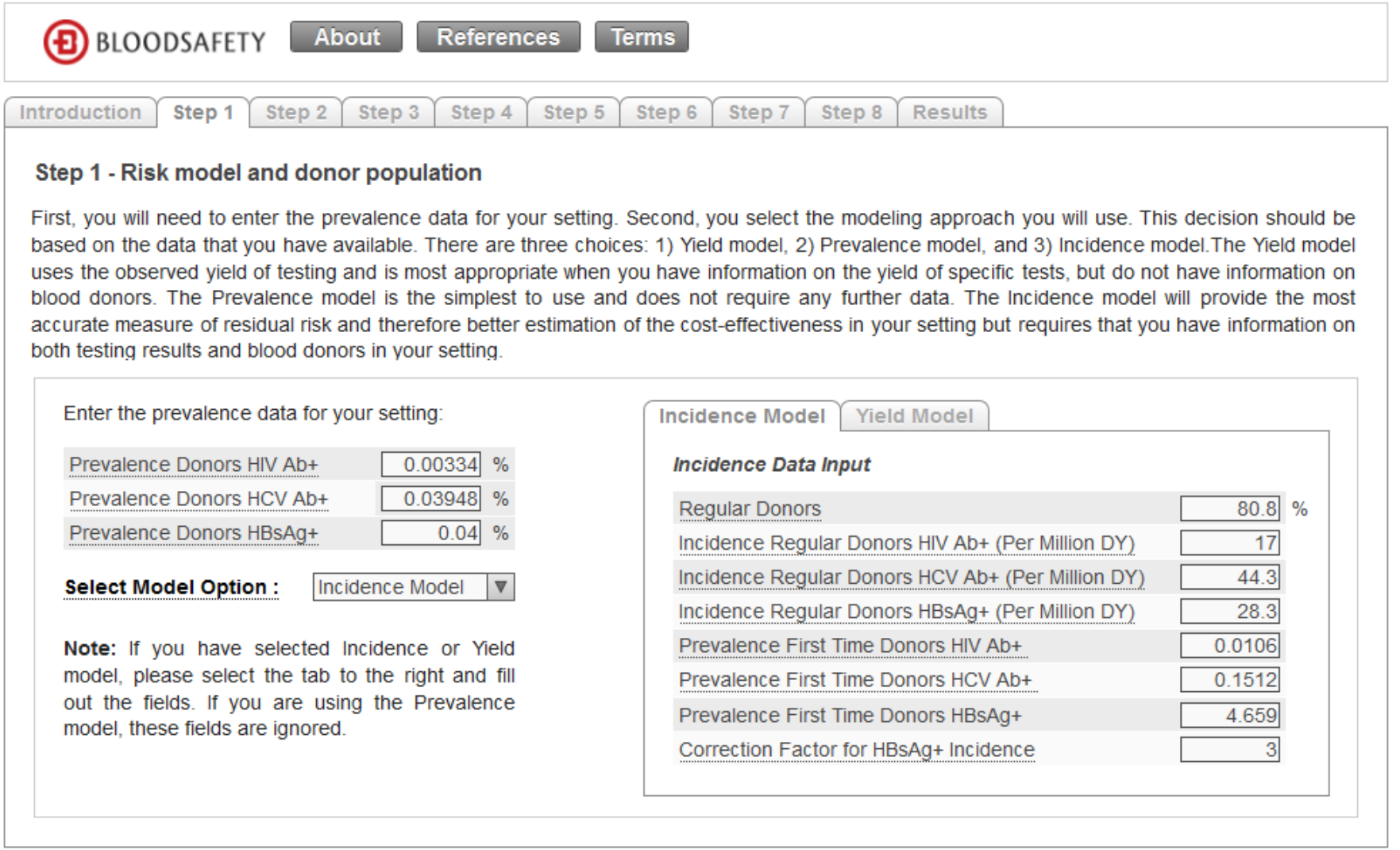
- ISBT TTID working party

- CUA workgroup (Brian Custer, Mart Janssen, Gijs Hubben, Rene van Hulst)

- A large group of people who provided the data for the 6 countries included in the tool (USA, Netherlands, Brazil, Ghana, Thailand, South Africa)

Questions and comments?

Steps in the Analysis



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Step 3 - Infectious Window Periods

If you are interested in Minipool NAT for your setting, please specify a pool size on the right side of the table below. Optionally, you may also adjust the window periods of the tests. However, unless you have specific data on the windows periods of the tests available in your setting, it is better to use the pre-loaded data.

HIV Ab	20.3	Days
HBsAg	38.3	Days
HBsAg (late stage)	24	Days
HCV Ab	58.3	Days
HIV Combo (Ab,p24)	15	Days
HCV Combo (Ab,Ag)	12.5	Days
HIV ID-NAT, Ab	5.6	Days
HBV ID-NAT, HBsAg	20.6	Days
HBV ID-NAT, HBsAg (late stage)	12.9	Days
HCV ID-NAT, Ab	4.9	Days

Multiplex Minipool NAT

For the pool size you select the window periods will automatically be estimated.

Pool Size	6	
HIV MPNAT, Ab	8.74	Days
HBV MPNAT, HBsAg	26.19	Days
HCV MPNAT	6.35	Days
HBV MPNAT, HBsAg (late stage)	11.87	Days

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Step 6 - HIV+ Recipient

Data on HIV disease progression and costs of treatment in your setting or a similar one are necessary. Please complete as much of the table below as you can. If you do not have the requested information please leave the pre-loaded values. For more data and statistics, please see the WHO site.

Basic Reproduction Ratio of HIV		0	
Availability of Antiretroviral Therapy to HIV Infected Recipients		95	%
Recipients Infected with HIV before Transfusion		0.5	%
Duration of WHO Stages 1 and 2		5	years
Extension of WHO Stage 3 by Antiretroviral Therapy		12	
Cost of Basic Care for HIV	$/year	5408	
Cost of Basic Care for AIDS	$/year	11534	
Cost of Antiretroviral Therapy	$/year	5447	

Results
Incremental Cost Effectiveness Ratios

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Infections remaining, Costs and DALYs | ICERs | Cost-Effectiveness Plane

Ab+HBsAg	Combo+HBsAg	MP Multi NAT	ID Multi NAT	Compared to:
17,141	NA	58,592	77,999	Do Nothing
	NA	2,934,025	4,078,056	Ab+HBsAg
		NA	NA	Combo+HBsAg
			24,729,432	MP Multi NAT

This table shows the incremental cost effectiveness ratios in US$ per DALY averted.

- Each screening strategy on the first row is compared to the strategies in the last column.
- NA (Not applicable) will appear for strategies you have not selected.
- A screening strategy is said to be Dominated if it is more costly and less effective than the comparator.
- A screening strategy is said to be Dominant if it less costly and more effective than the comparator.

Results
Cost Effectiveness Plane

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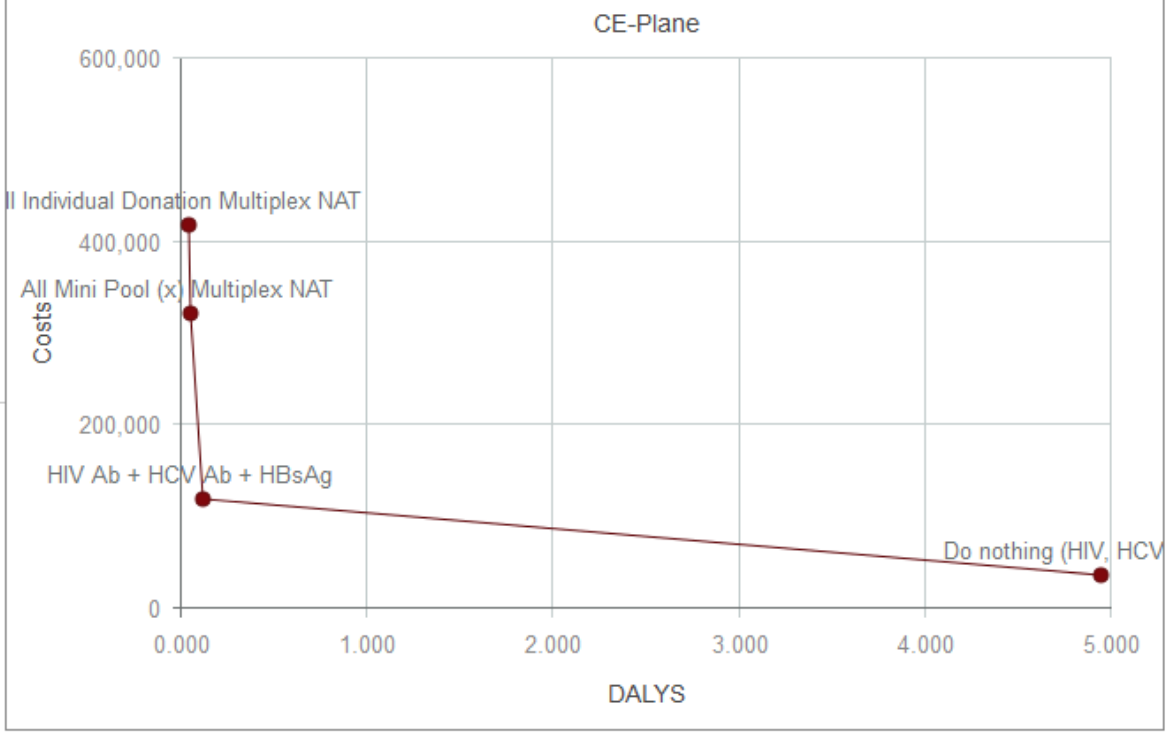

USA data on previous analyses

Intervention (Comparator)	Cost per QALY	Year of Publication
HCV Ab (no screen)	Cost saving	1997
HIV Ab (no screen)	3,600	1988
Mechanical barrier to prevent ABO-mismatch (none)	197,000	1996
WNV NAT (no screen)	520,000 – 897,000	2005
T cruzi Ab (no screen)	757,000 – 1,360,000	2010
PRT platelet concentrates (current screens)	458,000 – 1,816,000	2003
PRT platelets and plasma (current screens)	1,423,000	2010
Minipool HIV/HCV/HBV NAT (serology)	1,500,000	2004
Individual Donation HIV/HCV/HBV NAT (serology)	7,300,000	2004
Bacterial culture of platelets	Not available	
HTLV	Not available	
Syphilis	Not available	
TRALI risk reduction	Not available	

Conclusions

- The web-interface provides an easy to use tool for conducting cost-effectiveness analyses in blood screening.
- Countries where the largest numbers of infections are interdicted through testing tend to have the most favorable cost-utility results.
- As expected, the cost of testing and incremental health effects have a dramatic influence on cost-utility results. The value of the addition of NAT to serological testing is highly dependent on the country-specific prevalence and incidence of viral infections in blood donors.
- The cost-utility of blood safety interventions in some countries does not meet the threshold developed by UN/WHO.