Using the Heart Virtual Cross Match Function in CTR When Using Web Services – Training Packet

Introduction

The purpose of this training packet is to explore the Virtual Cross Match function currently available in the Canadian Transplant Registry to aid the allocation of deceased donor hearts. On October 15, 2019, coordinated use of this function will begin across Canada, to improve the process of allocating hearts to high-status (4S) heart recipients, by providing a sorted list of those recipients that have a negative virtual cross-match to the donor.

Current Situation

Currently, when a donor heart becomes available for allocation, donor coordinators in Canada must explore the possibility of offering that organ to recipients with a medical status of 4 (high-status) or 4S (highly-sensitized). Those recipients are listed, unfiltered, on the National Organ Waitlist, and completing the work required to assess each 4 or 4S recipient is a time-consuming task. The time required to contact transplant centres and explore the possibility of making an offer to a recipient, only to find that there is a positive cross-match to the donor is a huge time commitment for donor coordinators, and has a negative impact on donor families waiting for word that the donor organs have been allocated successfully.

This training will explore how the Virtual Cross Match function will cut down the number of 4S heart recipients that donor coordinators must consider for a heart offer. It will also explore what impact, if any, this process might have on recipient coordinators and HLA laboratory technicians.

The National Organ Waitlist

Although allocation begins with the emergence of a new donor organ, it cannot proceed without a pool of potential recipients.

The National Organ Waitlist (NOW) displays recipients awaiting transplants of heart, liver, lung, pancreas, stomach and small bowel. By default, the NOW is sorted by recipients having an urgent medical status, specifically heart recipients with a medical status of 4 or 4S, and liver recipients with a medical status of 4F or 3F.

Note that although this process is aimed at identifying status 4S recipients that have a negative virtual cross-match to your donor, all status 4 heart recipients should be considered for allocation.

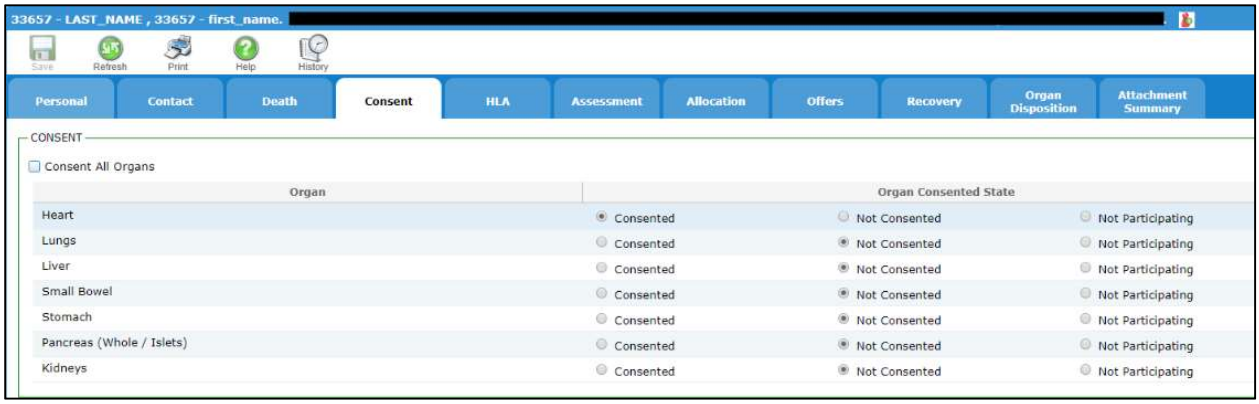
National Patient ID	Local ID	TX Type	Organ	Eligibility	MS	Urgent	State
CTR032363	120301 - identifier	Single	Heart		4	Yes	Active
CTR032214	118421 - identifier	Single	Heart		4	Yes	Active
CTR033658		Single	Heart		4	Yes	Active
CTR033655		Single	Heart		4	Yes	Active
CTR032914	127381 - identifier	Single	Heart		4	Yes	Active
CTR033621	137741 - identifier	Single	Heart		4	Yes	Active
CTR029855	87041 - identifier	Single	Heart		4	Yes	Active
CTR014395	22100 - identifier	Single	Heart		4	Yes	Active
CTR033529	136684 - identifier	Single	Heart		4S	Yes	Active
CTR033151	131081 - identifier	Single	Heart		4S	Yes	Active
CTR030890	100601 - identifier	Single	Heart		4S	Yes	Active
CTR030016	89561 - identifier	Multiple same donor	Heart Liver		4S 2	Yes No	Active Active
CTR029318	78741 - identifier	Single	Heart		4S	Yes	Active
CTR023661	30051 - identifier	Single	Heart		4S	Yes	Active
CTR015938	24908 - identifier	Single	Heart		4S	Yes	Active
CTR026728	39663 - identifier	Single	Heart		4S	Yes	Active
CTR030189		Single	Heart		4S	Yes	Active
CTR025442	33510 - identifier	Single	Heart		4S	Yes	Active
CTR030088	90761 - identifier	Single	Liver		3F	Yes	Active

In the above list, the 4S Medical Status for Heart means that the recipient has a cPRA of 80% or higher, making them highly sensitized, and difficult to match. To assess recipient's potential sensitivity to the donor, the HLA laboratory associated with the recipient must enter recipient serum, particularly Unacceptable Antigens. To be considered sensitized (4S), the resulting cPRA must be greater than or equal to 80%. As mentioned above, the issue with that list is the sheer number of recipients that must be contacted by donor coordinators.

Donor Pre-Requisites

When a donor is added in CTR, the donor coordinator must indicate which organs are consented for donation. Heart consent must be indicated in order for the donor coordinator to continue with functions related to Heart VXM.

!	*The first pre-requisite for using the VXM function in a deceased donor record is to record that consent for heart donation has been received.*



Another pre-requisite for VXM is the addition of HLA typing details to the donor record. That typing is required to be able to match the donor with potential recipients.

!	*The second pre-requisite to use the Virtual Cross match function in CTR is the addition of donor HLA Typing, to match against the HLA Serum values of prospective recipients.*

With the record created, and the heart consent and HLA data in place, the donor coordinator can now proceed to the Allocation tab. To access the VXM tool, the Heart subtab must be selected. Please be aware that current required HLA data for Heart VXM does not take allele-specific values into consideration and that weaker antibodies may not be listed in CTR. A discussion with the HLA team is recommended prior to acceptance of a VXM negative offer as the lab will be able to perform a more detailed VXM. Recipient HLA laboratories should perform a cell based cross-match to confirm the virtual cross-match results although this doesn't need to be done prospectively.

The Heart sub-tab initially displays an extract of the National Organ Waitlist filtered by Organ = Heart, as shown below.

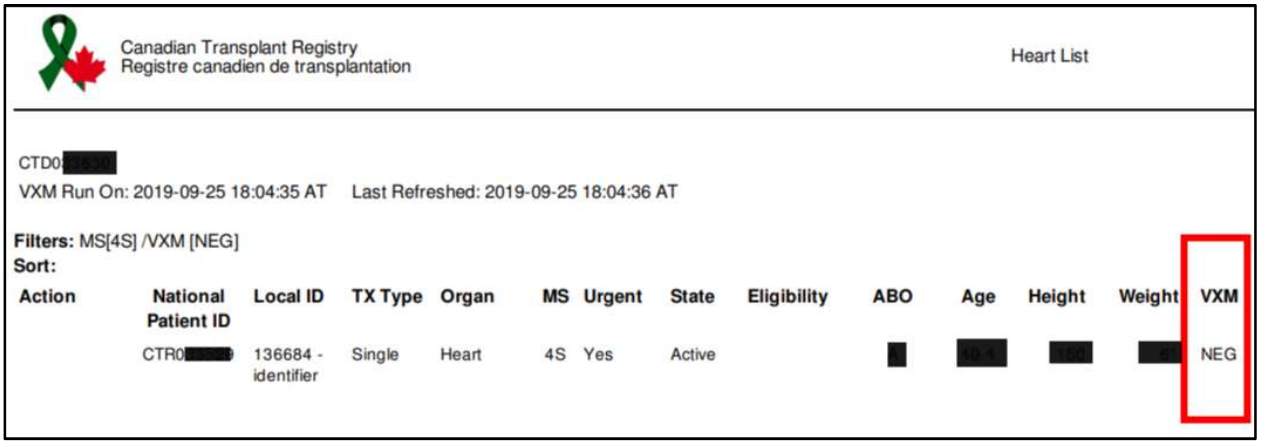
Web Services and Virtual Cross Match

For web services, three approaches have been presented for having the VXM function run, if you do not have direct access to CTR. Let us know which option works best for you.

1. The first option is to call CTR Customer Support at 1-855-274-2889 once the donor is created, including HLA typing and heart consent, and request that they run the VXM function and send you the list of status 4S recipients that have a negative virtual cross match to the donor.
   This option is advantageous, as it allows for immediate access to the filtered list of 4S recipients with a negative VXM to the donor, but it does require resource engagement on your end.
2. The second option is a regular mail-out of the filtered VXM list sent to you twice daily, at roughly 8:30 am ET and 4:30 pm ET, for every complete donor record that has been added by your ODO.
   This option is advantageous, as it does not require involvement from resources on your side, but it does have the obvious disadvantage of not being able to send out the VXM list in a timely manner.
3. The third option combines the first two, with a regular mail-out twice a day, and direct contact from your side for donor records when the regular mail-out time is too long to wait.
   The third option works because it provides flexibility for you, but also allows donor coordinators in your ODO to wait if the donor record is added close to the regularly-scheduled time for the lists to be mailed out.

One important item to note: all heart recipients with a medical status of 4 **must be considered for allocation of the donor heart regardless of the virtual cross match results.** To reiterate, the VXM function only serves to pare down the list of potential 4S recipients. All Status 4 heart recipients on the National Organ Waitlist must be considered for allocation regardless of VXM value. For that reason, we will always include the unfiltered list a Status 4 recipients, along with the 4S list filtered by VXM=NEG.

After the donor record has been created, consent has been added, HLA typing is complete and added, and VXM is run, the following report will be produced and delivered to you, in PDF format, displaying all of the 4S recipients that have returned a negative virtual cross-match result.



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Heart List

CTD0[redacted]

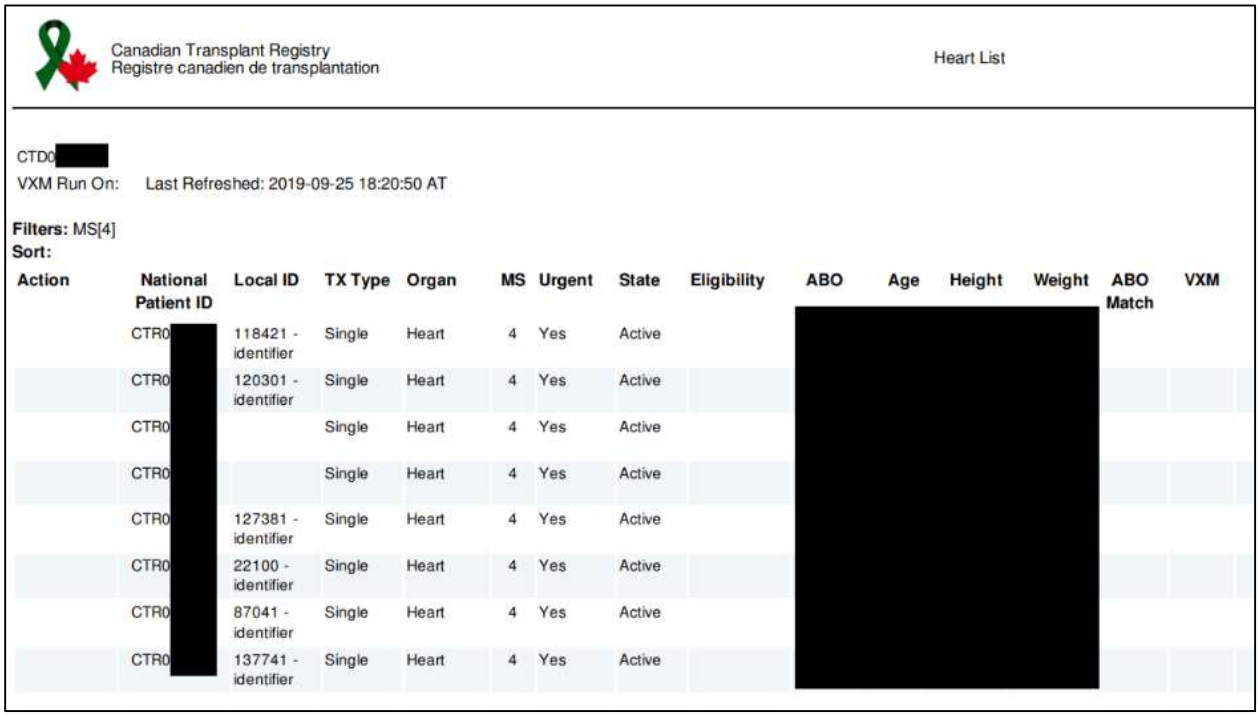
VXM Run On: 2019-09-25 18:04:35 AT Last Refreshed: 2019-09-25 18:04:36 AT

Filters: MS[4S] /VXM [NEG]
Sort:

Action	National Patient ID	Local ID	TX Type	Organ	MS	Urgent	State	Eligibility	ABO	Age	Height	Weight	VXM
	CTR0[redacted]	136684 - identifier	Single	Heart	4S	Yes	Active		[redacted]	[redacted]	[redacted]	[redacted]	NEG

Note the highlighted column to the right of the list, with the heading “VXM”. The values presented there should always be “NEG” for Negative Virtual Cross Match.

As mentioned above, we will also send the unfiltered list of Status 4 recipients. You will notice that the VXM column is blank for this list.



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Heart List

CTD0[redacted]
VXM Run On: Last Refreshed: 2019-09-25 18:20:50 AT

Filters: MS[4]
Sort:

Action	National Patient ID	Local ID	TX Type	Organ	MS	Urgent	State	Eligibility	ABO	Age	Height	Weight	ABO Match	VXM
	CTR0[redacted]	118421 - identifier	Single	Heart	4	Yes	Active		[redacted]					
	CTR0	120301 - identifier	Single	Heart	4	Yes	Active							
	CTR0		Single	Heart	4	Yes	Active							
	CTR0		Single	Heart	4	Yes	Active							
	CTR0	127381 - identifier	Single	Heart	4	Yes	Active							
	CTR0	22100 - identifier	Single	Heart	4	Yes	Active							
	CTR0	87041 - identifier	Single	Heart	4	Yes	Active							
	CTR0	137741 - identifier	Single	Heart	4	Yes	Active							

HLA Data

From an HLA point of view, requirements to allow for the successful running of the Virtual Cross Match function in CTR are as follows:

Donor HLA: Molecular HLA Typing must be added to the donor record. For any recipient listed as VXM=NEG, a cell based cross match must be performed to confirm the virtual cross-match results and entered in CTR. The crossmatch does not need to be performed in advance of the transplant.

Recipient HLA: In order to assess a heart recipient as Status 4S, recipient serum must be added, and a cPRA values of greater than 80% should result. In addition to the qualifying cPRA value for heart sensitization, the Unacceptable Antigens are used by the VXM tool to perform the virtual cross match.

The above represents the extent of the requirement for execution of the Heart VXM function in CTR, from an HLA standpoint.

Recipient Coordinators

We began with the pool of recipients known as the National Organ Waitlist, and we end with the role of the Recipient Coordinator in the use of VXM functionality in CTR.

We do not expect that any substantial change will be required from a recipient point of view as a result of this implementation.

The one clear change that you can expect as a result of this process being put in place is the reduction in instances of positive cross match between Heart donor organs being considered for transplant to your recipients.

Conclusion

The coordinated use of the Virtual Cross Match function currently available in CTR will begin on October 15, 2019. The immediate effect of this process is expected to be filtering of 4S heart recipients with a negative virtual cross match to a donor. It is expected that, by allowing donor coordinators to focus on high-status (status 4) heart recipients and only those 4S (highly-sensitized) recipients that present a negative virtual cross-match to the donor, the allocation time will be reduced, benefitting both the donor coordinator community, and the families of deceased donors.

If you have any questions about the above training packet, require clarification, or wish to provide any form of feedback, please send us your comments at transplantregistry@blood.ca.