Using data to address the question: Who should perform a virtual crossmatch?

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Introduction

The virtual crossmatch (VXM) has been defined as an assessment of immunologic compatibility using a recipient's antibody profile and a donor's HLA antigens/alleles

VXM offers several advantages over prospective flow physical crossmatches (FXM) including cost-saving, quickly repeatable for multiple matches, reduced crossmatch turnaround time, and reduced allograft cold ischemia time. The recent approval of VXM by the Centers for Medicare & Medicaid Services as an alternative to physical crossmatches has further contributed to its growing adoption. Accordingly, the qualifications necessary for personnel performing VXMs have become an important consideration.

At Virginia Commonwealth University, VXMs are treated as antibody assessments rather than clinical consults. Recipients' antibody profiles are pre-established during routine clinical testing with antibody risk stratification determinations based on strength, shared eplets, and sensitization history; and a VXM is performed for each potential kidney, lung, and heart transplant candidate. The high VXM volume necessitates a workflow in which technologists can conduct VXMs independently, with additional clinical consults performed by the laboratory director as needed. This study aims to demonstrate that comprehensive training and a standardized workflow allows technologists to perform VXMs accurately and reliably.

Methods

- Between 01/01/2025 and 03/31/2025, VCUHealth HLA technologists completed VXMs for 153 deceased donors, totaling 296 donor-patient pairs.
- During the VXM assessment, a technologist determines the VXM to be either "acceptable" or "unacceptable", following systematic criteria.
- For this study, each VXM was retrospectively reviewed for accuracy in donor typing translation and VXM assessment.
- Discrepancies were categorized by error type, severity, and whether they reflected deviation from the lab's SOP or a knowledge gap that could benefit from further education.

Results

Figure 1. Accuracy of Reported VXMs

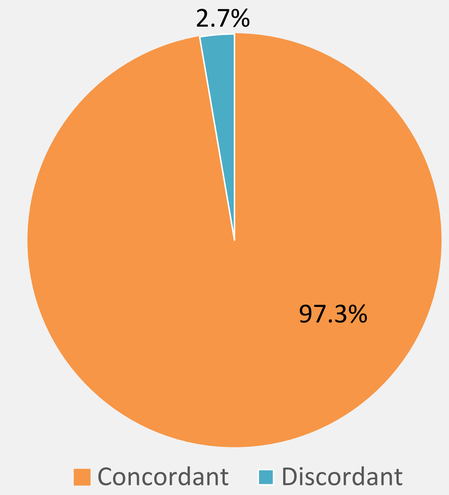


Table 1. Type and Severity of Discordant VXMs

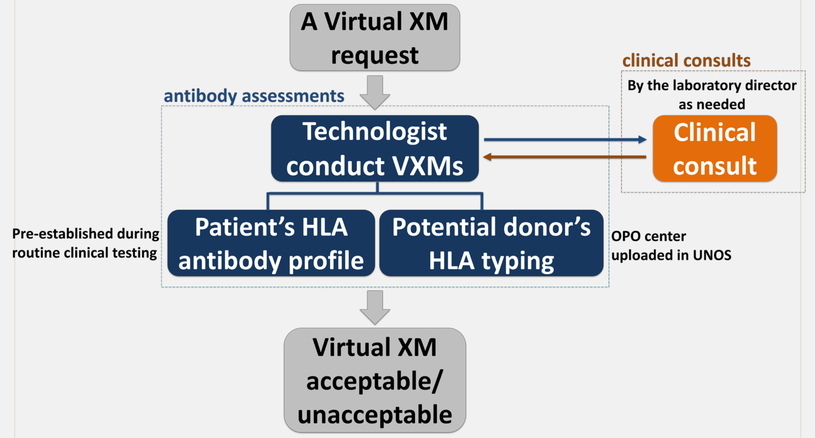
	#	VXM Assessment Incorrect?	Severity	Deviation or Knowledge Gap?
Error in Donor Typing				
Missed null allele	2	No	Minor	Knowledge Gap
Serological equivalents	1	No	Moderate	Knowledge Gap
Error in VXM Assessment				
Sample date	2*	No	Minor	Deviation
Missed DSA (other DSA called)	1	No	Minor	Deviation
Missed repeat mismatches	1	No	Minor	Deviation
Missed cPRA	1*	Yes	Severe	Deviation

* discrepancies were caught and prompt follow-up corrected report was submitted.

Discussion

VXMs were concordant in 97.3% of cases (Figure 1). Discrepant VXMs were observed in 8 of 296 cases (2.7%, detailed in Table 1). Six of the cases were categorized as minor, one as moderate, and one as severe. With VXMs reviewed by trained senior staff shortly after initial release, any errors were promptly identified, corrected, and a revised report issued before a clinical decision was reached. This study also highlighted opportunities for further education, which centered around donor typing translation likely resulting from recent UNET updates allowing donor typing to be entered as high resolution.

This study demonstrates that sufficient operational protocols and training allow for VXMs to be performed by technologists with oversight by the director in a safe and effective manner.



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The authors have no conflicts to disclose.

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