Virtual Crossmatch Workload and Transplant Conversion at a Single Center: Impact of cPRA, ABO, Race, and Organ Type

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April 2021-Dec 2025
Retrospective study period

1,027
Transplant candidates

2,628
VXM assessments

2.56
VXMs per candidate overall

BACKGROUND AND AIM

Virtual crossmatch (VXM) assesses immunologic compatibility between transplant candidates and potential donors based on candidate's alloantibody profile compared to the donor's histocompatibility antigens.

Study Aim

To evaluate the number of VXM assessments performed per candidate and determine how candidate characteristics influence that number.

METHODS

- Retrospective review of all VXM assessments performed at one transplant center
- Study period: April 2021 through December 2025
- Events linked to candidates using a center-specific Patient ID
- Characteristics: organ type, race, ABO, UNOS cPRA, and transplant status
- Primary outcome: VXMs per candidate, summarized as median and interquartile range (IQR)

Analysis population

All VXMs for each candidate were included. Results compare workload across clinically relevant candidate groups.

- Abdominal = kidney + kidney/pancreas (K/P) + pancreas
- Thoracic = heart + lung + heart/lung
- Dual abdominal/thoracic = kidney/heart + kidney/lung

Primary measure

Median VXMs per candidate (IQR)

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Figure 1. Annual VXM Volume by Organ type

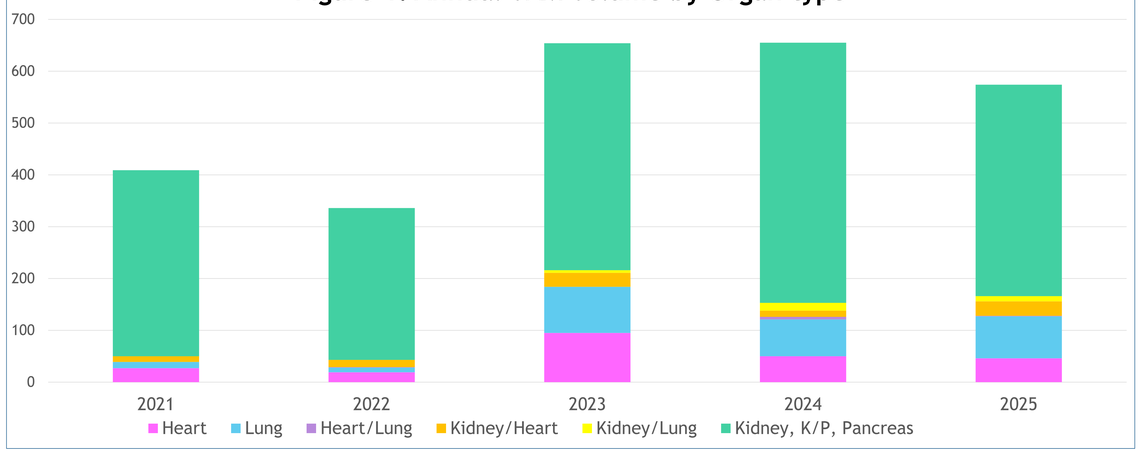
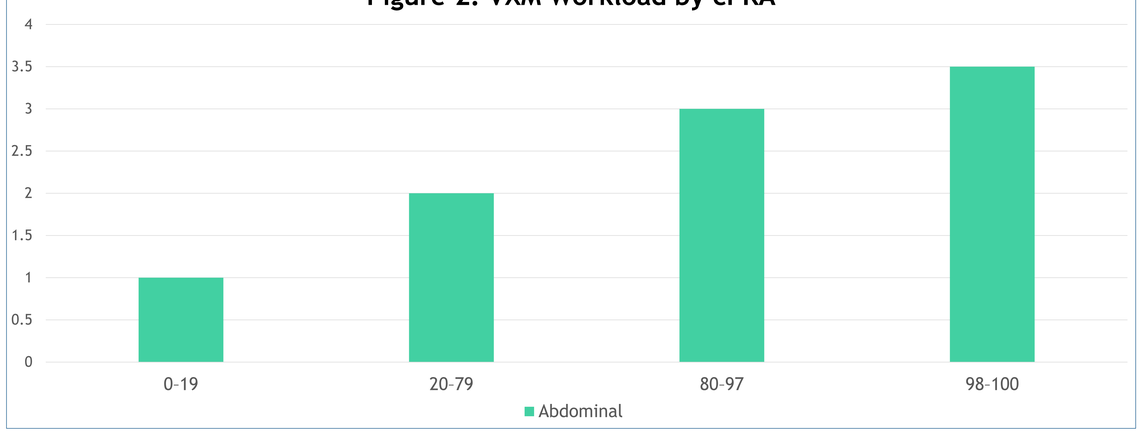
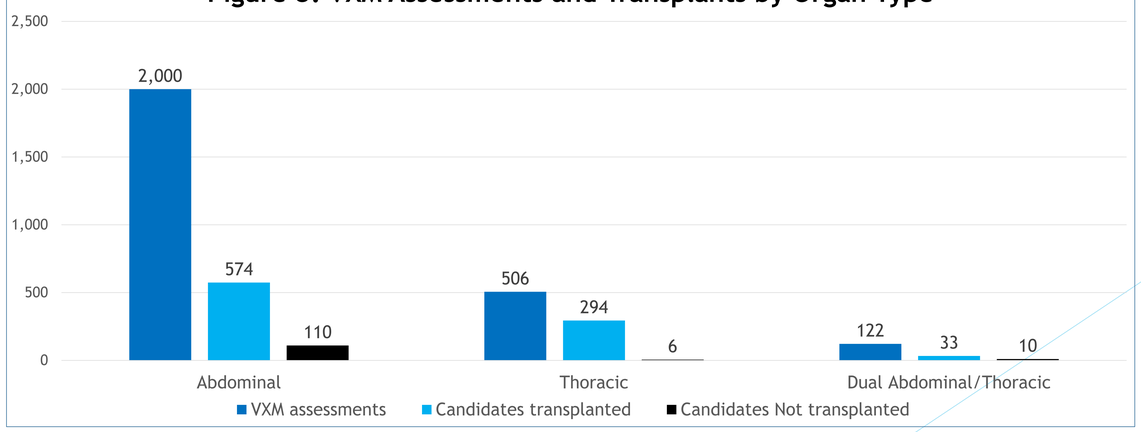


Figure 2. VXM Workload by cPRA



Median IQR: 1(1–2) | 2(1–4) | 3(2–6) | 3.5(2–7)

Figure 3. VXM Assessments and Transplants by Organ Type



Median (IQR): Transplanted — Abdominal 1 (1–3), Thoracic 1 (1–2), Dual Abdominal/Thoracic 2 (1-4).
Not transplanted — Abdominal 4 (2–6), Thoracic 2 (2–2), Dual Abdominal/Thoracic 2 (2-3.5).

Table 1. Differences by Patient Characteristics

Median VXMs per candidate (IQR)

Characteristic	Group	Median (IQR)
Organ type	Abdominal (n=684) Kidney: n=650, Kid/Pancreas: n=33, Pancreas: n=1	2(1-3)
	Thoracic (n=300) Heart: n=138, Lung: n=152, Heart/Lung: n=10	1(1-2)
	Dual Abdominal/Thoracic (n=43) Kidney/Heart: n=33, Kidney/Lung: n=10	2(1-4)
Race*	African American (n=377)	2(1-3)
	Caucasian (n=310)	1(1-2)
ABO	A (n=346)	2(1-3)
	B (n=162)	1(1-2)
	O (n=449)	1(1-3)
	AB (n=70)	1(1-2.75)

*Race comparison displays African American and Caucasian candidates; other reported race categories are not shown.

CONCLUSIONS

- VXM workload varies by sensitization level and organ type.
- Workload stratification helps laboratories estimate the effort needed to support transplant-center populations.
- A small subset of candidates, particularly those with high cPRA, accounts for a disproportionate share of VXM activity.
- Overall, abdominal and thoracic transplant candidates who underwent a transplant had a lower median number of VXMs than candidates who were not transplanted.
- Candidates with different organ type and race varied in VXM volumes. Among ABO groups, group A candidates had a higher median number of VXMs than groups B, O and AB.