

Informing blood donor safety and blood supply management in the United States: factors affecting donor time to return after low hemoglobin deferral

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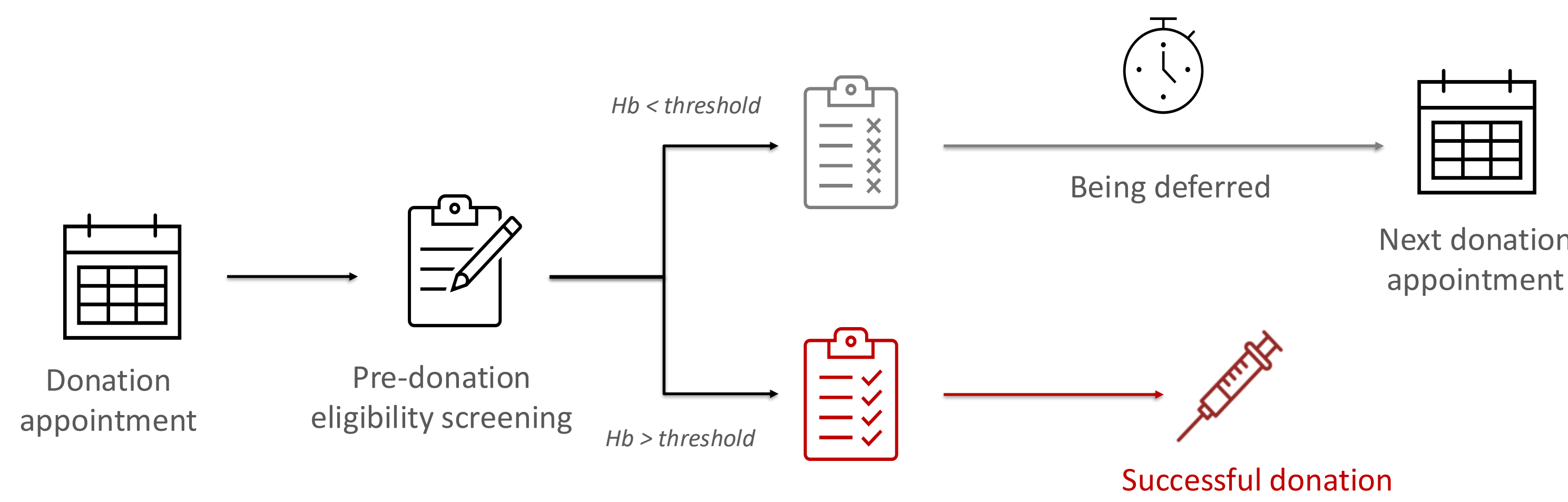
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Introduction

- Non-remunerated, voluntary blood donations assure a sustainable supply of blood and blood products for healthcare. However, balancing **blood demand** and **blood donor safety** remains a persistent challenge.
- **Concerns regarding donor safety:** Frequent donations without sufficient time for iron recovery can lead to **iron deficiency and anemia**.¹
- **Concerns regarding blood supply:** Blood establishment *temporarily defer* donors with low hemoglobin (Hb) levels, while intended to protect donors, could **discourage donors from returning**, destabilizing blood supply.¹
- Despite these concerns, low Hb deferral periods vary across countries,¹ suggesting limited evidence on the optimal deferral length.

The optimal length of deferral period?

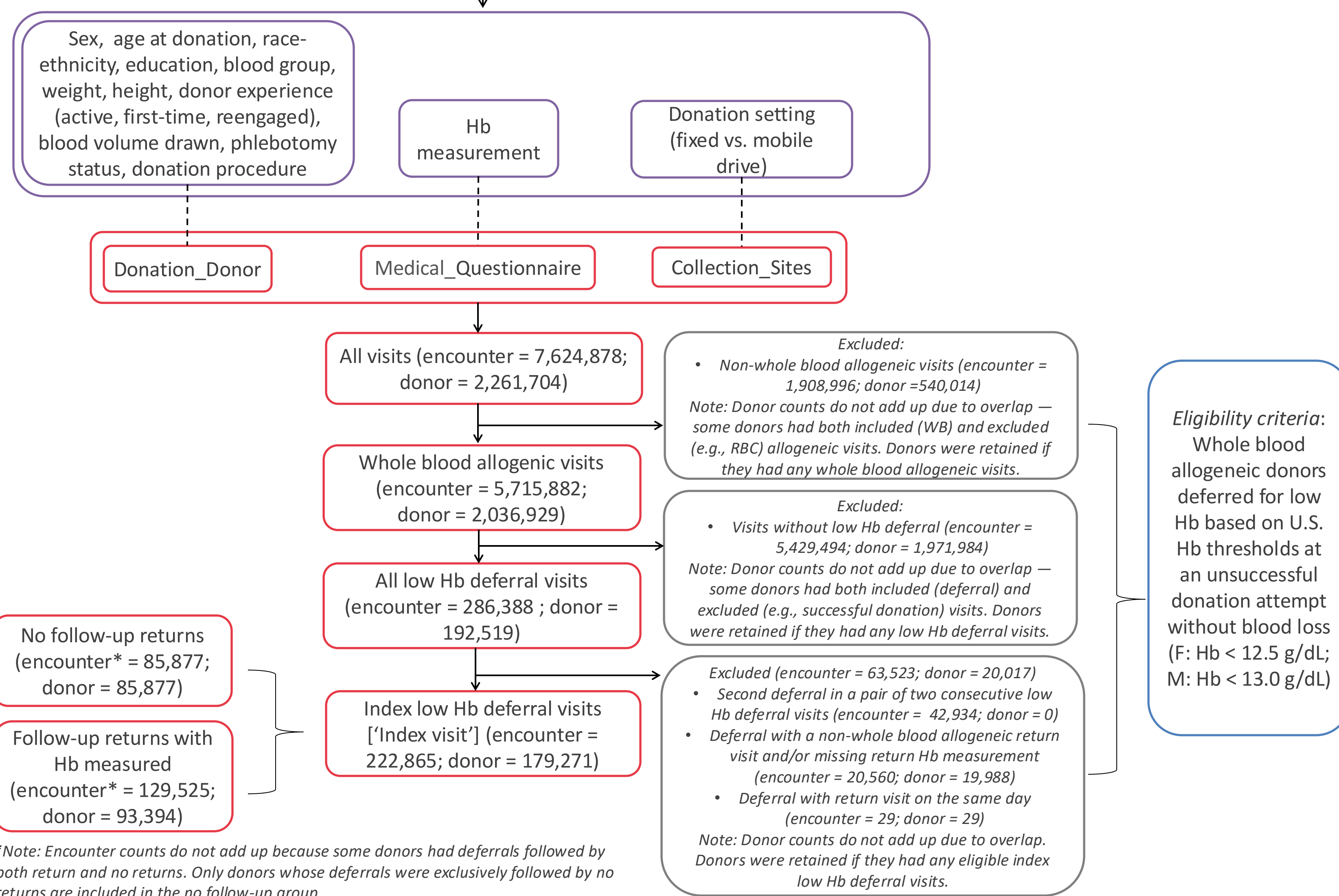


Objective

To identify **factors** affecting **donor time to return** after being deferred for low hemoglobin, facilitating future research on optimizing donor return periods after a low hemoglobin deferral.

Methods

Data linkage & Participant selection



Statistical analyses

- We analyzed whole blood donors deferred for low Hb between 2017–2022 in the U.S., where donors are deferred for only *one day*.
- We used Kaplan-Meier curves to examine factors associated with donor time to return within one year of low Hb deferral. Variables included donor characteristics at the index visit: index Hb level, sex, age, race-ethnicity, education, donor experience (active, first-time, reengaged [last donation > 2yr prior]), and prior donation history (red blood cell (RBC) loss in the previous 12 months and prior deferral experience). Donors who did not return after one year were censored.
- We assessed repeated deferral rates stratified by index Hb levels and time to return among females and males separately to explore potential interaction effects between time to return and index Hb.

Results

- Deferred donors returned significantly faster for donors who were male, White, had post-secondary education, were active repeat donors, had a history of prior low Hb deferral, had index Hb levels near the eligibility threshold, or had greater RBC loss in the prior year (Figure 1 & Table 1).

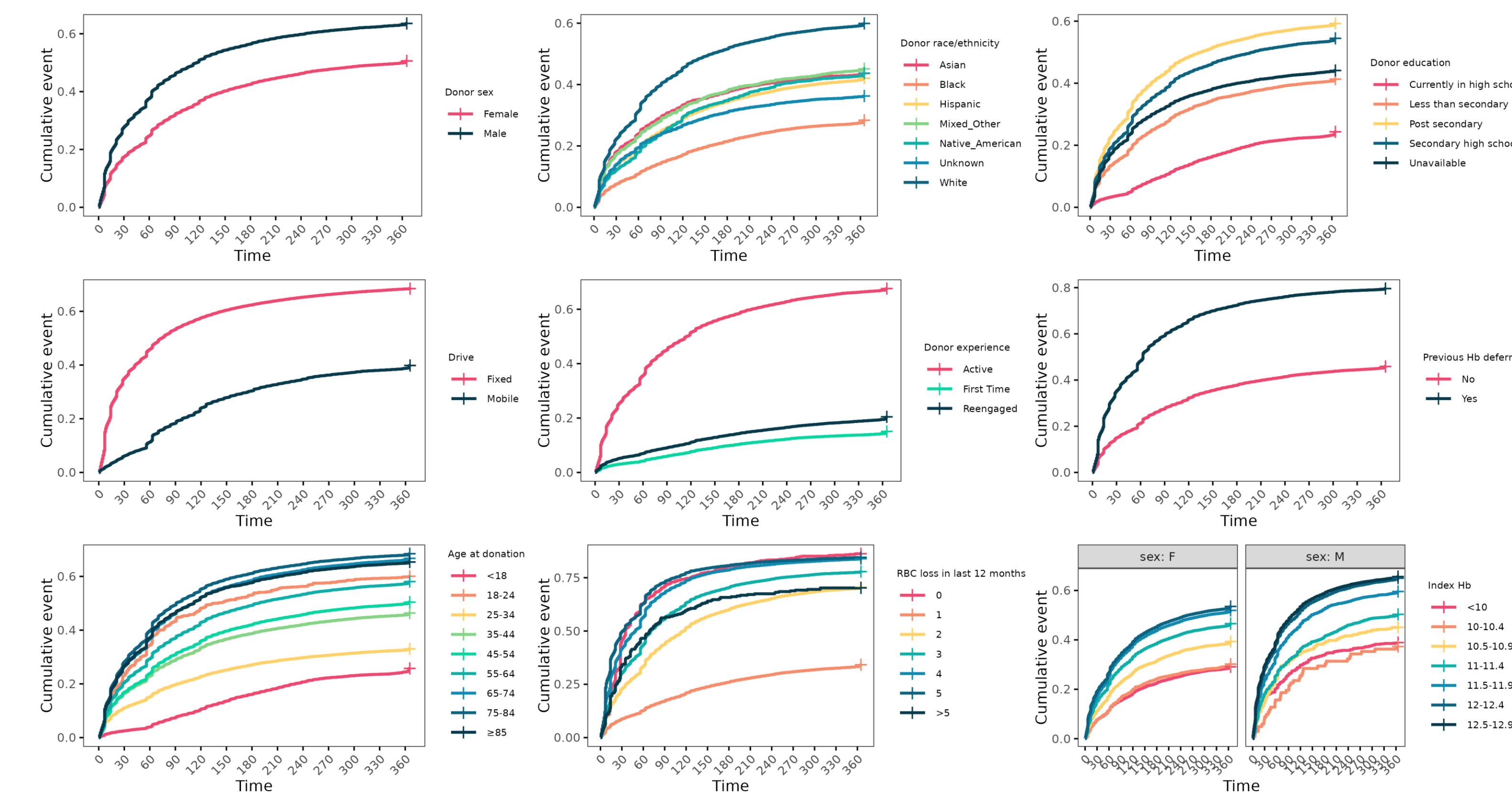


Figure 1. Cumulative incidence of donor return following low hemoglobin deferral by donor characteristics at the index visit.

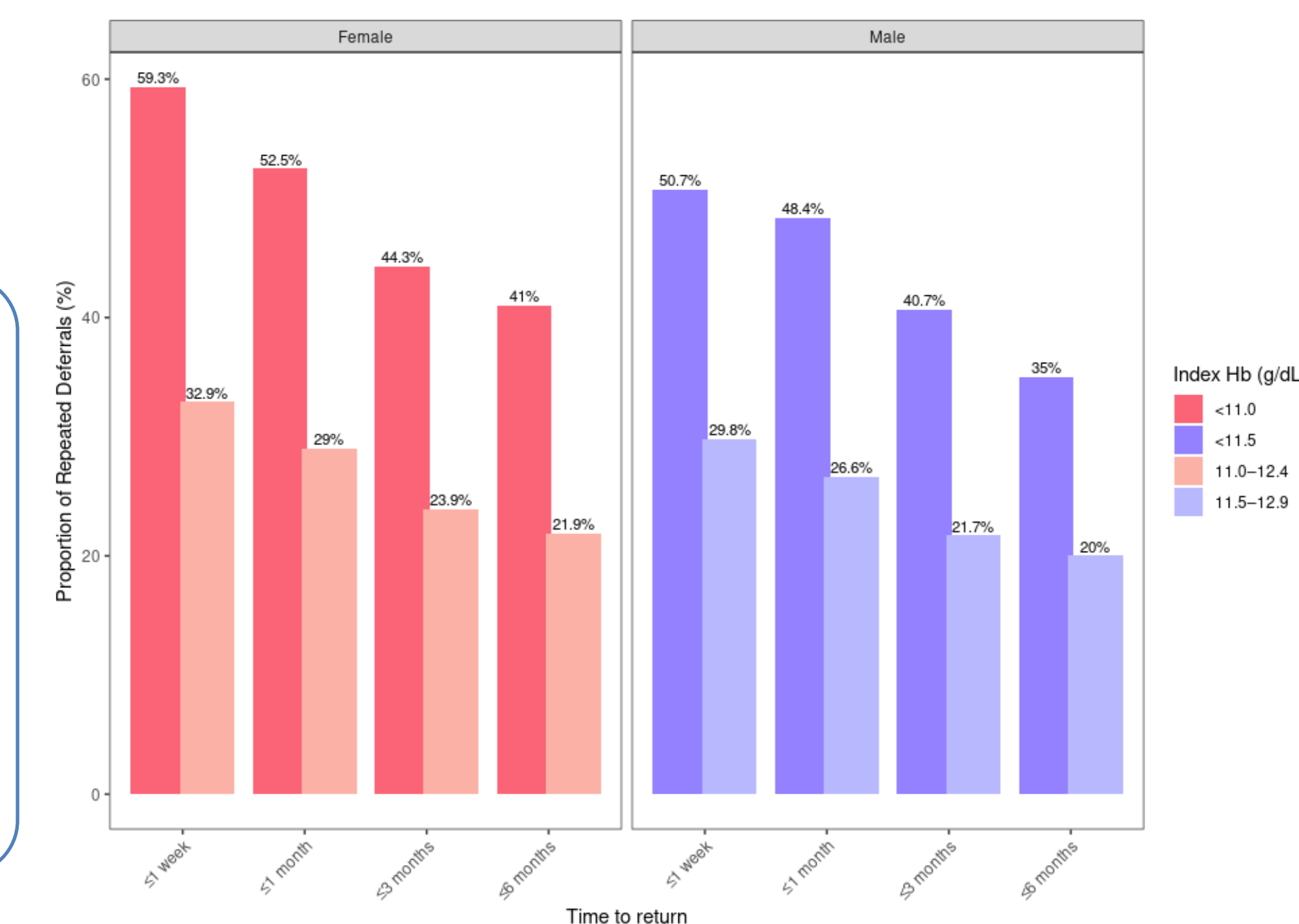


Figure 2. Repeated deferral rates by time to return and index hemoglobin levels.

Table 1. Median return time of donors deferred for low hemoglobin by donor characteristics at the index visit.

Factor	Index deferral visits (n)	Returns (n)	Median Return Time (days) (95% CI)
Donor sex			
Female	190,795	96,609	363 (95% CI: 356–364)
Male	32,070	20,384	117 (95% CI: 112–119)
Donor race-ethnicity*			
White	144,154	86,369	160 (95% CI: 156–162)
Donor education*			
Post secondary	141,183	83,675	165 (95% CI: 161–168)
Secondary	26,790	14,588	243 (95% CI: 231–252)
Drive*			
Fixed	98,311	67,318	74 (95% CI: 72–76)
Donor experience*			
Active	156,905	106,052	115 (95% CI: 113–117)
Previous Hb deferral*			
Yes	43,594	34,694	63 (95% CI: 63–63)
Age at donation*			
45–54	35,196	20,433	188 (95% CI: 182–194)
55–64	37,052	24,705	112 (95% CI: 107–112)
65–74	28,255	19,337	91 (95% CI: 90–95)
75–84	8,808	5,762	112 (95% CI: 105–116)
≥85	908	545	137 (95% CI: 115–182)
Index Hb*			
12–12.4 (Female)	107,003	57,230	259 (95% CI: 252–266)
11.5–11.9 (Female)	47,398	24,621	307 (95% CI: 291–322)
12.5–12.9 (Male)	18,959	12,454	99 (95% CI: 96–105)
12–12.4 (Male)	7,913	5,140	112 (95% CI: 106–119)
11.5–11.9 (Male)	2,999	1,786	147 (95% CI: 134–175)
RBC loss in last 12 months*			
1	31,717	22,398	117 (95% CI: 113–119)
2	27,177	21,157	70 (95% CI: 70–72)
3	22,319	18,726	49 (95% CI: 47–50)
4	11,519	9,734	31 (95% CI: 29–34)
5	292	205	69 (95% CI: 56–85)
≥5	618	533	35 (95% CI: 31–42)

*Categorical levels that did not have available median return time are not shown. Hb: Hemoglobin. RBC: Red blood cell

Conclusion

- Donor return behavior after low Hb deferral varies substantially across subgroups defined by baseline donor characteristics.
- Considering these factors in defining low hemoglobin deferral periods could improve donor management.
- Further research assessing the relationship between donor time to return after low Hb deferral and the risk of repeated Hb deferral, while accounting for these factors, could inform policies aimed at reducing repeated deferral without compromising donor retention.

References

1. Goldman M, Magnussen K, Gorlin J, Lozano M, Speedy J, Keller A, et al. International Forum regarding practices related to donor haemoglobin and iron. Vox Sanguinis. 2016 Nov;111(4):449–55.

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- For both female and male donors, repeated Hb deferrals were more likely to occur among donors with index Hb levels further below the eligibility threshold—nearly twice as frequent compared to those whose levels were near the threshold—regardless of return timing (Figure 2).