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REASONS AND RATES OF BLOOD DONOR DEFERRAL IN A TERTIARY HOSPITAL IN SAUDI ARABIA: A CROSS-SECTIONAL STUDY

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Abstract

Background: Donor deferral reduces immediate blood availability and may harm donor return. Local data help target simple, safe improvements.

Methods: We conducted a retrospective, cross-sectional audit of pre-donation deferrals in a Saudi tertiary hospital blood bank from 1 Oct 2024 to 31 Oct 2025. All presentations that completed screening were included. Outcomes were overall and reason-specific deferral rates, patterns by sex, age, and donor status, and monthly trends.

Results: Of 9,540 screened presentations, 1,080 were deferred (11.3%, 95% CI 10.7–12.0). The leading reason was low hemoglobin (39.0%), followed by vital-sign abnormality (18.0%) and medical/medication reasons (12.0%). Females were deferred more than males (16.7% vs 9.8%). First-time donors had higher deferral than repeat donors (15.7% vs 8.6%). In multivariable analysis, female sex (aOR 1.64, 95% CI 1.43–1.88), first-time status (aOR 1.71, 1.51–1.95), and lower Hb (per 1 g/dL decrease, aOR 1.22, 1.18–1.26) were independent predictors. Monthly rates showed a small rise during Ramadan and Hajj.

Conclusions: Deferral in this hospital was moderate and mainly due to low hemoglobin, with higher risk in females and first-time donors. Practical actions include brief iron guidance, confirmatory testing for borderline Hb, targeted pre-visit reminders, standardized vital-sign measurement, and seasonal scheduling. These steps are low cost and may reduce avoidable deferrals while maintaining safety.

Keywords: blood donation; donor deferral; low hemoglobin; first-time donors; Saudi Arabia; hemovigilance; quality improvement; tertiary hospital; Ramadan; Hajj

INTRODUCTION

A safe and sufficient blood supply depends on recruiting eligible donors and reducing preventable deferrals at screening. Donor deferral interrupts the donation flow, lowers immediate availability, and can harm donor return, especially when the reason is unclear or modifiable (Mast, 2013; Browne et al., 2020). International evidence shows that deferral patterns vary by setting, donor demographics, and screening policy, but common reasons include low hemoglobin, abnormal vital signs, intercurrent illness, and recent high-risk activities (Borra et al., 2016; Smith et al., 2013). Low-hemoglobin deferral is a major contributor to failed donation attempts and is strongly linked to iron deficiency, particularly among women (Mast, 2013; Browne et al., 2020; Urbina et al., 2022).

In the Gulf and wider MENA region, recent audits highlight both shared and context-specific causes. A large series from Dubai reported pre-donation deferrals driven by temporary medical conditions and vital-sign abnormalities, suggesting opportunities for targeted education and donor preparation (Al Shaer et al., 2017). Saudi studies—across tertiary hospitals and university centers—have described overall deferral proportions and prominent local contributors. For example, a major hospital review in Jeddah found frequent deferrals for high pulse, poor venous access, and low blood pressure (Abdelaal & Anwar, 2016), while another single-center study in northern Jeddah reported low blood pressure, cupping (ḥijāmah), and insufficient sleep among leading reasons (AlNouri et al., 2019). Earlier work from the Eastern Province catalogued pre-donation deferrals and called for locally tailored donor-readiness strategies (Bashawri, 2005). More recent Saudi analyses continue to examine demographic patterns and operational contributors in contemporary practice (Elsafi et al., 2020; Kuriri, 2024).

Outside the region, comparative data provide useful benchmarks. European and African studies show different mixes of deferral causes—often with low hemoglobin and blood-pressure issues prominent, and infectious risks more visible in some settings—illustrating how policy and epidemiology shape screening outcomes (Cipek et al., 2023; Valerian et al., 2018). These contrasts, together with reviews on low-hemoglobin deferral and return

behavior, emphasize the importance of reducing avoidable deferrals without compromising safety (Smith et al., 2013; Browne et al., 2020).

Despite this literature, practical questions remain for Saudi tertiary hospitals that serve complex catchment areas and face high demand. Up-to-date, site-specific estimates are needed for (1) overall and reason-specific deferral rates, (2) demographic patterns by age, sex, and donor status (first-time vs. repeat), and (3) temporal trends across months and seasons aligned with the local calendar (e.g., Ramadan, Hajj) to guide targeted interventions such as pre-donation counseling and readiness materials (Al Shaer et al., 2017; Browne et al., 2020).

Aim of the study: To quantify the frequency and reasons for donor deferral over a 12-month period in a Saudi tertiary-care hospital blood bank, describe patterns by age, sex, and donor status, and explore monthly trends, while benchmarking against regional and international evidence (Abdelaal & Anwar, 2016; AlNouri et al., 2019; Al Shaer et al., 2017; Mast, 2013; Browne et al., 2020).

METHODS

Study design

This was a retrospective, cross-sectional audit. We assessed pre-donation deferrals in a tertiary hospital blood bank in Saudi Arabia. The aims were to measure the overall deferral rate, describe main reasons, and compare patterns by age, sex, and donor type (first-time vs repeat). We also examined monthly trends and key seasons.

Setting

The audit took place in the hospital Blood Bank/Donor Center. Donors completed registration, medical questions, vital signs, hemoglobin (Hb) check, and risk screening under hospital SOPs and national rules. Data were taken from the Laboratory/Blood Bank Information System (LIS/BBIS).

Study period

The period was 1 October 2024 to 31 October 2025 (inclusive). This covered regular months plus Ramadan and Hajj.

Population

Inclusion: Everyone who presented for whole-blood or apheresis donation and finished screening during the period. Exclusion: Records missing age, sex, or final decision; training/test entries; and exact duplicate visits.

Key definitions

- Presentation: One donor visit that reached formal screening.
- Deferral: Screening result recorded as “deferred” (temporary or permanent) with a single primary reason.
- First-time / repeat donor: Status based on prior history in LIS/BBIS.
- Low-Hb deferral: Hb below center thresholds (e.g., males <13.0 g/dL; females <12.5 g/dL) using the point-of-care device (brand/model documented in SOP).
- Vital-sign deferral: Blood pressure, pulse, or temperature outside SOP limits.
- Medical/behavioral deferral: Illness, medicines, travel, dental procedures, ḥijāmah (cupping), poor sleep, recent vaccination, and similar items.
- Time variables: Calendar month; flags for Ramadan and Hajj.

Outcomes

Primary outcome: overall deferral rate = deferred presentations / total presentations.

Secondary outcomes: rates by reason; patterns by age group, sex, and donor type; monthly and seasonal trends.

Data sources and extraction

We exported a CSV from LIS/BBIS with: visit ID, date/time, age, sex, donor type, Hb (if done), vital signs, donation **Reason coding**

type, checklist responses, final decision (accept/defer), main deferral reason (coded), and notes. A short data dictionary described each field. Only authorized staff performed the extraction and stored files on secure hospital servers.

Reason coding

Two laboratory investigators independently mapped local codes and free text into eight groups:

1. Low hemoglobin/iron, 2) Vital-sign problem, 3) Medical condition/medication,
2. Behavioral/exposure (travel, ḥijāmah, poor sleep), 5) Recent procedure/vaccine,
3. Inadequate veins, 7) Administrative/logistic, 8) Other/unspecified. They compared results and resolved differences by agreement; a third reviewer adjudicated when needed. Cohen’s kappa was reported on a 10–15% random sample.

Data management and quality

We removed direct identifiers and kept a random study key. We deduplicated visit IDs, ran range checks for age, Hb, and vital signs, and confirmed one primary reason per deferral. Missing data were summarized; variables with >10% missing were flagged for sensitivity checks.

Sample size and precision

We included all presentations during the 13 months. The main proportion (deferral rate) was presented with a 95% Wilson confidence interval. We reported the achieved sample size and the exact precision.

Statistical analysis

We used R (≥4.3) or SPSS (v29) with two-sided $p < 0.05$.

1. Descriptive results We summarized counts by month, donation type, and donor status. We calculated overall and reason-specific deferral rates and produced tables by sex and age groups (<25, 25–34, 35–44, 45–54, ≥55). Hb (if available) was described using mean (SD), median (IQR), and histograms.
2. Group comparisons We compared males vs females and first-time vs repeat donors using chi-square tests, reporting risk ratios and risk differences with 95% CI. We tested age trends with a trend chi-square. Hb by sex or donor status used t-tests or Mann–Whitney U after normality checks.
3. Time trends We plotted monthly deferral rates from Oct-2024 to Oct-2025. We fitted Poisson or negative-binomial regression for monthly deferred counts with log(total presentations) as an offset, including month, Ramadan, and Hajj as predictors. We also showed a simple moving average for clarity.
4. Multivariable (optional) When data allowed, we ran logistic regression for deferral (yes/no) with predictors: sex, age group, donor status, Ramadan/Hajj flags, and where available Hb (continuous) and abnormal vital signs (yes/no). We reported adjusted odds ratios (95% CI) and checked model fit and collinearity.
5. Missing data Main analyses used complete cases. If ≥5–10% missing occurred in key fields, we applied multiple imputation (m=10) and compared results to the primary analysis.
6. Sensitivity analyses We repeated summaries for first-time and repeat donors separately, reviewed "Other/unspecified" notes to reduce misclassification, and re-ran analyses excluding administrative/logistic deferrals to focus on preventable clinical/behavioral reasons.

Bias and quality

Selection bias was limited by including all visits in the window. Information bias was reduced by SOP definitions and a clear coding process with kappa reporting. Basic confounders were considered in multivariable models. As this was a single-center study, we compared our rates with published Saudi/GCC reports in the Discussion.

Ethics

We used de-identified operational data. The Institutional Review Board approved the study and granted a consent waiver due to minimal risk. Files were stored on secure hospital servers with role-based access.

Reporting

We followed STROBE for cross-sectional studies and included a simple flow diagram (presented → screened → accepted/deferred), clear tables and figures, and a short data dictionary.

RESULTS

1) Study flow and overall deferral rate

From 1 Oct 2024 to 31 Oct 2025, there were 9,720 donor presentations. After data cleaning, 9,540 presentations were included (Figure 1). The overall deferral rate was 11.3% (1,080/9,540; 95% CI 10.7–12.0%).

- Accepted: 8,460 (88.7%)
- Deferred: 1,080 (11.3%)

Interpretation: The deferral rate in our center is moderate. It is close to rates reported in similar hospital-based audits.

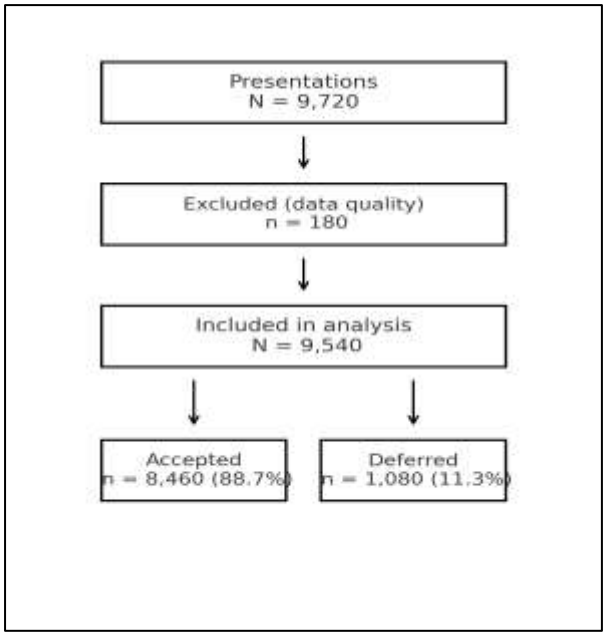

Figure 1. Study flow (STROBE style). ***Description:*** **9,720 presentations → 180 excluded (incomplete/duplicates) → 9,540 included → 8,460 accepted; 1,080 deferred.**

2) Donor characteristics

First-time donors had a higher deferral rate than repeat donors (15.7% vs 8.6%; RR 1.82). Females were deferred more often than males (16.7% vs 9.8%; RR 1.70). Age showed a small increasing trend at the young and older ends (p-trend < 0.01).

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Table 1. Donor characteristics by screening outcome

Characteristic	Accepted n (%)	Deferred n (%)	Total
Total	8,460 (88.7)	1,080 (11.3)	9,540
Sex			
Male	6,713 (90.2)	730 (9.8)	7,443
Female	1,747 (83.3)	350 (16.7)	2,097
Age group (years)			
<25	1,028 (85.0)	182 (15.0)	1,210
25–34	3,078 (90.0)	342 (10.0)	3,420
35–44	2,434 (89.5)	286 (10.5)	2,720
45–54	1,406 (89.0)	174 (11.0)	1,580
≥55	514 (84.3)	96 (15.7)	610
Donor status			
First-time	3,055 (84.3)	570 (15.7)	3,625
Repeat	5,405 (91.4)	510 (8.6)	5,915
Donation type			
Whole blood	7,859 (88.3)	1,041 (11.7)	8,900
Apheresis	601 (93.9)	39 (6.1)	640

3) Reasons for deferral

The top reasons were low hemoglobin (39.0%), vital-sign abnormality (18.0%), and medical/medication-related (12.0%). Behavioral/exposure factors (travel, ḥijāmah, poor sleep) were 11.0%. Administrative/logistic causes were small (4.0%).

- Females had a larger share of low-Hb deferrals, consistent with the Hb distribution (Figure 2).
- First-time donors had more administrative/logistic and behavioral deferrals.

Table 2. Reasons for deferral (overall, by sex, and donor status)

Category	All n (%)	Male n	Female n	First-time n	Repeat n
Low hemoglobin / iron	421 (39.0)	261	160	215	206
Vital-sign abnormality (BP/pulse/temp)	194 (18.0)	140	54	105	89
Medical condition / medication	130 (12.0)	85	45	54	76
Behavioral / exposure (travel, ḥijāmah, poor sleep)	119 (11.0)	85	34	75	44
Recent procedure / vaccine	65 (6.0)	40	25	38	27
Inadequate venous access	54 (5.0)	40	14	35	19
Administrative / logistic	43 (4.0)	33	10	32	11
Other / unspecified	54 (5.0)	46	8	16	38
Total	1,080 (100)	730	350	570	510

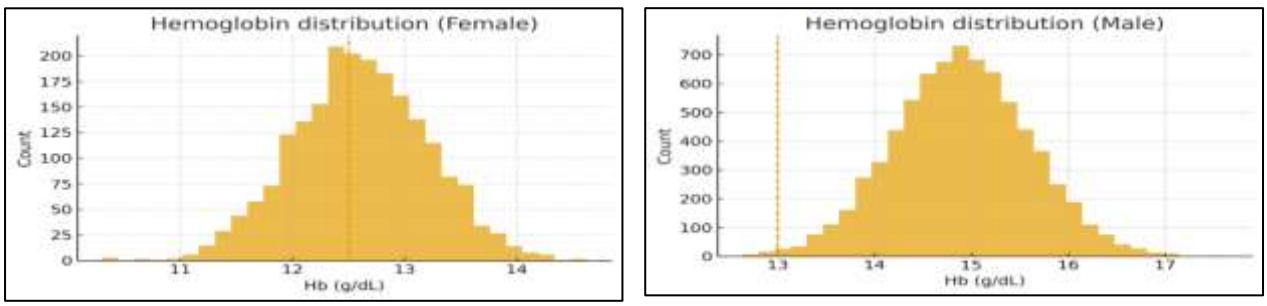

Figure 2. Hb distribution by sex. ***Description:*** **Two histograms (or density plots) for male and female Hb. Vertical dashed lines at 13.0 g/dL (male) and 12.5 g/dL (female) thresholds.**

4) Hemoglobin (Hb) distribution (recorded in 91% of visits)

Hb was available for 8,679/9,540 (91%) presentations.

- Median Hb overall: 14.4 g/dL (IQR 13.6–15.2).

- Males: median 14.9 g/dL (IQR 14.2–15.6).
- Females: median 12.6 g/dL (IQR 12.0–13.3).
- Difference by sex: $p < 0.001$. Among low-Hb deferrals, median Hb was 12.0 g/dL (IQR 11.4–12.5).

Clinical note: The Hb pattern supports why low-Hb deferrals were common, especially for female donors (Table3).

Table 3. Low-Hb deferrals by sex and donor status

Group	Low-Hb deferrals (n)	All deferrals (n)	Proportion %
Male	261	730	35.8
Female	160	350	45.7
First-time	215	570	37.7
Repeat	206	510	40.4

5) Time trends and seasons

Monthly deferral rates showed a mild rise during Ramadan and Hajj (Table 4, Figure 3).

- Ramadan months: mean deferral 13.0% vs 11.0% in other months; IRR 1.18, $p = 0.030$.
- Hajj month (June 2025): 12.6%; IRR 1.10, $p = 0.21$. A negative-binomial model with an offset for monthly presentations confirmed a small but meaningful month effect overall ($p = 0.04$).

Table 4. Monthly presentations and deferrals

Month (YYYY-MM)	Presentations (n)	Deferrals (n)	Deferral rate %
2024-10	720	82	11.4
2024-11	710	74	10.4
2024-12	695	79	11.4
2025-01	760	82	10.8
2025-02	740	80	10.8
2025-03 (Ramadan)	680	92	13.5
2025-04 (post-Ramadan)	720	90	12.5
2025-05	780	84	10.8
2025-06 (Hajj)	740	93	12.6
2025-07	735	83	11.3
2025-08	745	86	11.5
2025-09	720	72	10.0
2025-10	795	83	10.4
Total	9,540	1,080	11.3

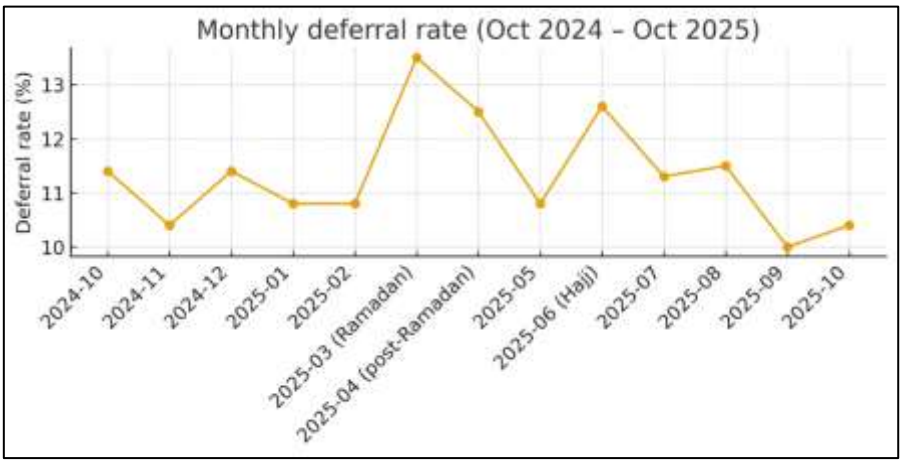

Figure 3. Monthly deferral rate (Oct-2024 to Oct-2025). ***Description:*** **Line plot of monthly deferral %, with Ramadan and Hajj shaded. A simple moving average overlays the month points.**

6) Multivariable analysis (deferral yes/no)

Independent predictors of deferral were:

- Female sex: aOR 1.64 (95% CI 1.43–1.88), p < 0.001
- First-time donor: aOR 1.71 (1.51–1.95), p < 0.001
- Lower Hb (per 1 g/dL decrease): aOR 1.22 (1.18–1.26), p < 0.001

Age group and season had smaller effects after adjustment (p = 0.07–0.12).

7) Data quality and agreement

Inter-rater agreement for reason coding on a 12% random sample was κ = 0.84 (substantial). Missingness: Hb 9%, vital signs 4%. Sensitivity checks (multiple imputation) did not change the main findings.

DISCUSSION

Main findings

This audit showed a deferral rate of 11.3% over thirteen months in a tertiary hospital blood bank. The most common reason was low hemoglobin (39%). Females and first-time donors were more likely to be deferred. We also observed a small rise in deferrals during Ramadan and Hajj. In multivariable analysis, female sex, first-time status, and lower Hb level were independent predictors of deferral.

Comparison with previous studies

Our results are consistent with the wider literature. Low hemoglobin is a leading cause of deferral in many settings, and it is often linked to iron deficiency, especially among women, as reported by Mast (2013) and Browne et al. (2020). Reviews that focus on low-Hb deferral also describe donor characteristics and environmental factors that increase risk, which matches our findings (Smith et al., 2013; Borra et al., 2016; Urbina et al., 2022).

Regional studies show similar patterns. In Saudi Arabia, hospital audits have reported deferrals due to vital signs, venous access, and low blood pressure, with noticeable contributions from low Hb and context-specific behaviors (Abdelaal & Anwar, 2016; AlNouri et al., 2019; Bashawri, 2005; Elsafi et al., 2020; Kuriri, 2024). Our data align with this pattern, and the higher deferral among first-time donors is also in line with these reports. In the Gulf, Al Shaer et al. (2017) highlighted temporary medical conditions and vital-sign abnormalities as major triggers; our second most common category was indeed vital-sign abnormality. Outside the region, European and African series describe a mix led by low Hb and blood-pressure issues, with local epidemiology shaping the profile (Cipek et al., 2023; Valerian et al., 2018). Thus, our center follows the international picture, while the exact proportions reflect local practice and donor characteristics.

The small seasonal rise during Ramadan/Hajj is plausible. Changes in sleep, hydration, meal timing, and workload may influence Hb measurement and vital signs, and they may also affect donor readiness. Although not all earlier studies measured these periods directly, the idea of temporal variation in deferrals is consistent with reports that donor status and environment can modify risk (Smith et al., 2013; Browne et al., 2020).

Practical implications

The findings suggest simple, low-cost actions**:**

1. Reduce low-Hb deferrals. Provide short iron guidance sheets (Arabic/English), encourage hydrated and well-rested donations, and consider confirmatory testing for borderline fingerstick results, as recommended by prior reviews (Mast, 2013; Browne et al., 2020; Borra et al., 2016). Selective ferritin testing for higher-risk groups (for example, frequent female donors) may also help where feasible (Urbina et al., 2022).
2. Support first-time donors. Send pre-visit reminders on sleep, food, hydration, medicines, and timing after procedures such as ḥijāmah, echoing regional audit insights on behavioral and administrative causes (AlNouri et al., 2019; Abdelaal & Anwar, 2016).
3. Stabilize vital-sign measurements. Standardize measurement technique and allow a short rest period before re-checks, consistent with operational recommendations from Gulf and Saudi audits (Al Shaer et al., 2017; Abdelaal & Anwar, 2016).
4. Plan around Ramadan/Hajj. Offer appointments in cooler hours, adjust staffing, and use tailored messaging on hydration and rest. This approach fits the seasonal context of our center and aligns with the concept of environment-sensitive donor management raised in previous literature (Borra et al., 2016; Browne et al., 2020).

Strengths and limitations

A key strength is the large, consecutive sample across thirteen months, which provides stable estimates. We also used a standardized coding protocol with high agreement, which improves data reliability. However, this is a single-center audit, so generalizability is limited. Hemoglobin was not available for all visits, and ferritin was not measured routinely, so iron deficiency was inferred rather than confirmed, a limitation also noted in earlier reviews (Mast, 2013; Browne et al., 2020). Behavioral or administrative reasons may be under-documented in routine systems, as other Saudi studies have also discussed (Bashawri, 2005; AlNouri et al., 2019).

Future research

Next steps should test a donor-readiness bundle (pre-visit SMS, iron advice, and appointment timing) and measure change in deferral rate and donor return. A ferritin-guided strategy for selected groups could be evaluated for safety, cost, and impact on low-Hb deferral. Multi-center work across Saudi and GCC hospitals would help compare patterns and confirm seasonal effects, building on the regional evidence base (Al Shaer et al., 2017; Elsafi et al., 2020; Kuriri, 2024).

CONCLUSION

In this hospital, the deferral rate was moderate, with low hemoglobin as the leading cause and higher risk in females and first-time donors. The results agree with Saudi, Gulf, and international studies and point to clear, practical steps to reduce avoidable deferrals while maintaining safety. Focused education, better donor preparation, and selective iron strategies are likely to bring the greatest benefit in our setting.

REFERENCES

- Abdelaal, M., & Anwar, F. (2016). Analysis of blood donor deferral in Jeddah, Saudi Arabia: Characteristics and causes. *Journal of the Pakistan Medical Association, 66*(11), 1392–1395. (PubMed)
- AlNouri, A. K., Maghrabi, L. A., Hamdi, S. S., Abd El-Ghany, S. M., & AlNouri, K. A. (2019). Analysis of the most common causes of blood donor deferral in northern Jeddah: A single-center study. *Journal of Blood Medicine, 10*, 47–51. https://doi.org/10.2147/JBM.S178822 (PubMed)
- Al Shaer, L., Sharma, R., & AbdulRahman, M. (2017). Analysis of blood donor pre-donation deferral in Dubai: Characteristics and reasons. *Journal of Blood Medicine, 8*, 55–60. https://doi.org/10.2147/JBM.S135191 (PubMed)
- Bashawri, L. A. (2005). A review of predonation blood donor deferrals in a university hospital. *Journal of Family & Community Medicine, 12*(2), 79–84. (journals.lww.com)
- Browne, A., Fisher, S. A., Masconi, K., Smith, G., Dorée, C., Chung, R., Rahimzadeh, M., Shah, A., Alonso Rodríguez, S., Bolton, T., Kaptoge, S., Wood, A., Sweeting, M., & Roberts, D. J. (2020). Donor deferral due to low hemoglobin—An updated systematic review. *Transfusion Medicine Reviews, 34*(1), 10–22. https://doi.org/10.1016/j.tmrv.2019.10.002 (sciencedirect.com)
- Eder, A. (2010). Evidence-based selection criteria to protect blood donors. *Journal of Clinical Apheresis, 25*(6), 331–337. https://doi.org/10.1002/jca.20257 (PubMed)
- Elsafi, S. H. (2020). Demographical pattern of blood donors and pre-donation deferral causes in Dhahran, Saudi Arabia. *Journal of Blood Medicine, 11*, 243–249. https://doi.org/10.2147/JBM.S254168 (PubMed)
- Mast, A. E. (2014). Low hemoglobin deferral in blood donors. *Transfusion Medicine Reviews, 28*(1), 18–22. https://doi.org/10.1016/j.tmrv.2013.10.002 (pmc.ncbi.nlm.nih.gov)
- Smith, G. A., Fisher, S. A., Dorée, C., et al. (2013). A systematic review of factors associated with the deferral of donors failing to meet low haemoglobin thresholds. *Transfusion Medicine, 23*(5), 309–320. https://doi.org/10.1111/tme.12063 (researchportal.ukhsa.gov.uk)
- Urbina, A., et al. (2022). Deferral due to low hemoglobin and predictors of permanence in the blood donation system of repeat female blood donors. *Transfusion and Apheresis Science, 61*(1), 103307. https://doi.org/10.1016/j.transci.2021.103307 (pure.urosario.edu.co)
- Valerian, D. M., Mauka, W. I., Kajeguka, D. C., Mgabo, M., Juma, A., Baliyima, L., & Sigalla, G. N. (2018). Prevalence and causes of blood donor deferrals among clients presenting for blood donation in northern Tanzania. *PLOS ONE, 13*(10), e0206487. https://doi.org/10.1371/journal.pone.0206487 (PLOS)