

Analysis of blood donor pre-donation deferral in Dubai: characteristics and reasons

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Background: To ensure an adequate and safe blood supply, it is crucial to select suitable donors according to stringent eligibility criteria. Understanding the reasons for donor deferral can help in planning more efficient recruitment strategies and evaluating donor selection criteria. This study aims to define donor pre-donation deferral rates, causes of deferral, and characteristics of deferred donors in Dubai.

Materials and methods: This retrospective study was conducted on all donors who presented for allogeneic blood donation between January 1, 2010, until June 30, 2013, in Dubai Blood Donation Centre, accredited by the American Association of Blood Banks. The donation and deferral data were analyzed to determine the demographic characteristics of accepted and deferred donors, and frequency analyses were also conducted.

Results: Among 142,431 individuals presenting during the study period, 114,827 (80.6%) were accepted for donation, and 27,604 (19.4%) were deferred. The overall proportion of deferrals was higher among individuals less than 21 years old (35%, $P<0.000$), females (44% were deferred compared to 15% of males, $P<0.0001$), and first-time donors (22% were deferred vs 14% of repeat donors, $P<0.0001$). The main causes for a temporary deferral were low hemoglobin and high blood pressure.

Discussion: The deferral rate among blood donors in Dubai is relatively high compared to the internationally reported rates. This rate was higher among first-time donors and females, with low hemoglobin as the major factor leading to a temporary deferral of donors. Strategies to mitigate deferral and improve blood donor retention are urged in Dubai to avoid additional stress on the blood supply.

Keywords: blood donation, blood safety, donor deferral, selection criteria

Introduction

Blood safety is a major concern all over the world, and blood donor selection and screening is one of the most important steps used to ensure blood safety.^{1,2} Though the demand for blood is decreasing in many countries, due to preoperative blood management, the demand for blood is constantly increasing in United Arab Emirates (UAE) due to the remarkable increase in population and high prevalence of hemoglobinopathies in the country; this mandates recruiting safe donors and prohibiting high-risk donors from donation. In spite of the importance of blood donor selection for blood safety, we need to consider that selection processes might have negative impacts on the blood supply, as many deferred donors might not return to donate again due to negative feelings resulting from their deferral.^{3,4} Hence, it is crucial to define a rational, evidence-based donor selection process and eliminate practices that lead to the unnecessary deferral of volunteered donors.^{5,6}

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In 2013, the UAE recorded a blood collection rate of 11.4 whole blood units per 1,000 inhabitants, with 19.8 whole blood units per 1,000 inhabitants in the city of Dubai. The national program for donor deferral in the UAE is based on the World Health Organization recommendations and complies with the American Association of Blood Banks (formerly AABB) standards. Blood donor centers in the UAE are dependent on volunteer blood donors, and all prospective blood donors must undergo a pre-donation health screening to determine their eligibility to donate blood. During the screening process, a detailed medical history is taken via a Donor History Questionnaire, and a physical examination is performed, during which weight, pulse, blood pressure, and temperature measurements are taken and hemoglobin levels are determined. Prospective donors who do not meet the criteria for donation are designated as deferred pre-donation.

The pre-donation deferral rate in the Middle East has been reported to vary from 19.2% in Saudi Arabia to 30.9% in parts of Iran.^{7,8} In the UAE, little is known about donor deferral, characteristics of deferred donors, and the rates of pre-donation deferral. The aim of the study is to describe pre-donation donor deferral and the approaches to deferral in Dubai, a city where the collected blood donations account for approximately 40% of the total donations in the UAE, to appreciate the role that deferrals play in transfusion safety. This might also help in designing more efficient recruitment strategies. UAE has high prevalence of thalassemia major, which demands regular and urgent blood supplies.⁹ Thus, the collection process and donor selection in Dubai need to be analyzed to avoid putting additional restrictions on the limited blood supply.

The objective of this study was to assess the frequency and reasons for donor deferral prior to the blood donation process so that temporarily deferred donors with correctable conditions could be recognized, appropriately educated, and guided to eligibly prepare them for future donation as well as to maintain continuous blood supply. To our knowledge, this is the first detailed analysis to report the pre-donation deferral rate and reasons for deferral in the blood donor population in the UAE.

Materials and methods

Dubai is one of the seven emirates of the UAE and has a population of nearly 2.2 million (as of 2013). Dubai's population is estimated to be 2.2 million, with two-thirds of the population falling between the ages of 20 and 39. Approximately 75% of Dubai's residents are males (1,677,330 males vs 536,515 females).¹⁰ The Dubai Blood Donation Centre (DBDC) in the Dubai Health Authority is the major local

supplier of blood and blood components for most of the governmental and private hospitals in the country. The DBDC collects and processes an average of 43,000 units of blood per year, covering 100% of the blood needs of the city of Dubai.

Overall study design

We conducted this retrospective study on volunteer donors aged 17–65 years who presented for blood donation between January 1, 2010, until June 30, 2013. The data set was restricted to allogeneic whole blood donations and included 142,431 prospective blood donations obtained from the donor database of the DBDC. Analyses were focused on deferrals based on vital signs and donor health interview. The data were retrieved from both first-time and repeat donors (eg, those who made at least two donations within past 2 years). This study does not address individuals who were self-deferred.

Ethical approval was obtained from the Medical Research Committee of the Dubai Health Authority (Reference: MRC-10/2012_05). The committee operates in accordance with the International Conference on Harmonisation's/Good Clinical Practice (ICH/GCP) guidelines.

Measures

Blood transfusions and donations are regulated by the Federal Government of the UAE and the UAE Supreme National Blood Transfusion Committee. Both regulatory bodies are in line with the international standards of the AABB that defines the specific requirements for donor recruitment and deferral criteria. In the pre-donation assessment, each blood donor is interviewed face-to-face and checked for vital signs (blood pressure and pulse), weight, and hemoglobin (Hb) level, which is measured using finger prick sample (Hemocue 201+, Hemocue, Inc., Mission Viejo, CA, USA).

Upon completion of the interview and review of the donor responses, the prospective donor is either declared fit to donate blood or alternatively deemed ineligible and deferred from blood donation. The criteria for donor deferral are shown in [Table S1](#). For our analysis, the reasons for deferral were categorized into seven groups (Table 1). As per policy in Dubai health authority, deferred donors are referred to a health-care professional for further evaluation.

Statistical analysis

Data were electronically retrieved from the DBDC database and were merged into a new data set. All personal identifiers

Table 1 Reasons for deferral: numbers and rates (per 10,000 donations) of deferred visits by first-time and repeat donors from January 2010 to June 2013

Deferral category	First-time (rate)	Repeat (rate)	Missing (rate)	Total (rate)
Low Hb	9,582 (673)	3,177 (223)	468 (33)	13,227 (929)
High blood pressure	2,263 (159)	871 (61)	32 (2)	3,166 (222)
Medical diagnosis/medication ^a	1,684 (118)	492 (35)	0 (0)	2,176 (153)
Fever/flu/cough	1,440 (101)	418 (29)	40 (3)	1,898 (133)
High-risk donor ^b	388 (27)	1,309 (92)	24 (2)	1,721 (121)
Infectious exposure ^c	655 (46)	147 (10)	0 (0)	802 (56)
Other ^d	3,262 (229)	1,032 (72)	320 (22)	4,614 (324)
Total number of deferred visits	19,274 (1,353)	7,446 (523)	884 (62)	27,604 (1,938)

Notes: ^aMedical diagnosis category includes deferrals due to cancer, glucose-6-phosphate dehydrogenase deficiency, surgical procedures, and/or conditions related to cardiac, gastroenterology, neurology, pulmonary, endocrinology, and urology diseases. Medication includes antibiotics. ^bDonors positive for infectious disease markers or at risk for exposure. ^cDonor at risk of infectious disease due to exposure to dentist, endoscopy, history of malaria, tuberculosis, typhoid, UK visit, tattoo, and needle prick. ^dIncludes other deferral reasons such as blood transfusion, positive antibody screening, pregnancy/abortion, apprehensive/cannot wait, age/weight out of the acceptable range, and/or no identification document, vaccination.

Abbreviation: Hb, hemoglobin.

were removed before analysis. The donation and deferral data were analyzed to determine the demographic characteristics of accepted and deferred donors. Data management and analysis were conducted using computer software (GraphPad Prism 5.0, GraphPad Software, Inc., San Diego, CA, USA). The significance limit was set at 0.05 and χ^2 test with Yates correction was used to determine statistical significance.

Results

During the study period, a total of 142,431 individuals presented for allogeneic blood donation at the DBDC (Table 2). Of those, 114,827 (80.6% of presenting individuals) were accepted for donation, and 27,604 (19.4%) were deferred. The majority of prospective donors were within the age group of 21–40 years (105,074 individuals; 73.8%), expatriates hailing from Asia (94,283 individuals; 66%), male (84% vs 16% of female), and repeat donors (55,021, 38.6% of presenting individuals).

The most common reasons for deferral among the blood donor candidates were low Hb (929 per 10,000 presentations; Table 1), high blood pressure (222 per 10,000 presentations), medical diagnosis and medication (153 per 10,000 presentations), fever/flu/cough (133 per 10,000 presentations), and high-risk donor (121 per 10,000 presentations). Of the total deferrals, 17% (4,614 out of 27,604) were classified as “other,” which indicates that the reason for deferral did not fit in any of the deferral categories used in our study. The deferral was higher in females (44% of females were deferred compared to 15% of males, $P<0.0001$) and first-time donors (22% first-time donors were deferred vs 14% of repeat donors, $P<0.0001$). The deferral proportions were almost similar across nationalities.

Table 2 Demographic details of all prospective donors who visited from January 2010 to June 2013

Characteristic	Total ^a n (%)	Deferred visits n (%)
Total	142,431	27,604 (19.4)
Gender		
Male	120,125 (84)	17,701 (15)
Female	22,095 (16)	9,729 (44)
Missing	211 (0)	174 (82)
Nationality		
Asian	94,283 (66)	17,853 (19)
Middle-Eastern	34,897 (24.5)	6,285 (18)
African	6,833 (5)	1,432 (21)
European	3,602 (2.5)	834 (23)
North American	1,129 (1)	258 (23)
Australian	454 (0)	81 (18)
South American	141 (0)	34 (24)
Missing	1,053 (1)	762 (72)
Age (years)		
17–20	6,208 (4.4)	2,144 (35)
21–30	50,262 (35.3)	8,549 (17)
31–40	54,812 (38.5)	9,348 (17)
41–50	22,934 (16.1)	4,442 (19)
51–60	5,728 (4)	1,309 (23)
61–65	592 (0.4)	171 (29)
Missing	1,895 (1.3)	1,641 (87)
Donation history		
First Time	86,413 (60.7)	19,274 (22)
Repeat	55,021 (38.6)	7,446 (14)
Missing	997 (0.7)	884 (89)

Note: ^aTotal number of prospective blood donations including the deferrals.

The demographic characteristics of individuals deferred are described in Table 3. Deferrals due to Hb levels were more frequent in females than males ($P<0.0001$), and in first-time donors than repeat donors ($P<0.0001$). Deferral due to blood pressure was more frequent among first-time donors ($P<0.05$). In addition, first-time donors and males were deferred due to medical diagnosis and medication

Table 3 Demographic characteristics and rates (per 10,000 prospective donations) of visits deferred due to low Hb, high blood pressure, medical diagnosis/medication, fever/flu, and being a high-risk donor, from January 2010 to June 2013^a

Variable/deferral reason	Low Hb	High blood pressure	Medical diagnosis/medication	Fever/flu/cough	High-risk donor	Total deferrals	Total visits
Gender							
Male	6,305 (443)	2,585 (181)	1,407 (99)	1,589 (112)	1,532 (108)	13,418 (942)	120,125
Female	6,854 (481)	563 (40)	294 (21)	300 (21)	162 (11)	8,173 (574)	22,095
Missing	68 (5)	18 (1)	475 (33)	9 (1)	27 (2)	137 (10)	211
Donation history							
First time	9,582 (673)	2,263 (159)	1,231 (86)	1,440 (101)	388 (27)	14,904 (1,046)	86,413
Repeat	3,177 (223)	871 (61)	396 (28)	418 (29)	1,309 (92)	6,171 (433)	55,021
Missing	468 (33)	32 (2)	89 (6)	40 (3)	24 (2)	653 (46)	997
Age (years)							
17–20	1,113 (78)	148 (10)	68 (5)	101 (7)	26 (2)	1,456 (102)	6,208
21–30	4,203 (295)	814 (57)	526 (37)	724 (51)	426 (30)	6,693 (470)	50,262
31–40	4,381 (308)	1,142 (80)	654 (46)	722 (51)	691 (49)	7,590 (533)	54,812
41–50	2,039 (143)	699 (49)	282 (20)	222 (16)	356 (25)	3,598 (253)	22,934
51–60	575 (40)	245 (17)	85 (6)	44 (3)	102 (7)	1,051 (74)	5,728
61–65	59 (4)	24 (2)	14 (1)	2 (0)	10 (1)	109 (8)	592
Missing	857 (60)	94 (7)	87 (6)	83 (6)	110 (8)	1,231 (86)	1,895

Note: ^aData are reported as number (rate).

Abbreviation: Hb, hemoglobin.

more often than repeat donors ($P<0.0001$) and female donors ($P<0.0001$).

Having a fever/flu/cough was the fourth most common reason for deferral in the DBDC; this reason for deferral was more likely to be cited among first-time donors than repeat donors ($P<0.0001$). Alternatively, deferrals due to being a high-risk donor were more likely in males than females ($P<0.0001$) and, surprisingly, in repeat donors than first-time donors ($P<0.0001$).

Discussion

Transfusion-transmissible infections have made both blood bankers and health authorities overly cautious to obtain a high level of blood product safety. Blood donors have to meet stringent eligibility criteria through questionnaire before donation to ensure blood safety. Donor deferral is a form of rejection and loss of time for both blood donors and blood bank. Therefore, having rational donor recruitment strategies with more substantial criterion, without affecting blood safety, may reduce the number of deferrals.

In this study, we report for the first time an analysis of deferred donors in Dubai, UAE, to add an epidemiologic perspective to donor deferral in the region. The proportion of presenting donors who were deferred in our study concurs with figures reported in neighboring countries such as Saudi Arabia (19.2%)⁷ and is even lower than the regionally reported rates of 25.6% and 30.9% in Iran.^{8,9} However, the international comparison shows that the deferral rate in this study (19.4%) is relatively higher than the rates reported

in Germany (6.2%),¹¹ France (10.8%),¹² USA (12.8%–15.6%),^{2,13} Japan (14%),¹⁴ Singapore (14.4%),¹⁵ Turkey (14.6%),¹⁶ India (5.8%–16.4%),^{3,4,17–19} and Nigeria (16%).²⁰ Though the differences in the deferral rates may probably be due to the differences in the donor population or donor selection criteria used, the relatively high rate of donor deferral in DBDC requires further improvements to the donor deferral process to avoid any psychological effects or negative impacts on prospective donors that may prevent them from future donations.

The current study shows that the majority of the donors at Dubai were males and first-time donors, which reflects the domination of the mobile population of expatriate males in the community. The considerable expatriate population in UAE, and in Dubai especially, is due to the increase of investments and job opportunities. Notably, the expat population is dominated by the SouthEast Asian countries, especially India and Pakistan, with majority of the population serving as average workforce in the manufacturing industries. Interestingly, the deferral rates tended to be higher in females and first-time donors, which is similar to deferred candidates worldwide, including those in USA,¹³ India,^{4,18} and Saudi Arabia.⁷

The study also reveals high rates of donor loss due to failure to meet Hb criteria. This may reflect the origin of the donors, as majority of them are from the Asian continent where the low Hb is the major cause of deferral. In addition, the possibility of nutritional patterns in the immigrant population affects iron status. Khurram et al²⁰ reported that

nutritional deficiencies, particularly iron deficiency (anemia), account for 6% of public health burden in subcontinent regions. The majority of donors with low Hb were females, and this is in line with other reports worldwide.^{3,17, 22–24} Low Hb has been reported as a major cause of deferral in many studies reported from Turkey, Brazil, Saudi Arabia, Japan, India, and Pakistan; the results of our study is also in line with these reports.^{6,7,14,19,25} We believe that combining anemia prevention measures and treatment in donor recruitment strategies could help regain the donors and developing a healthy blood donor pool. This process will also bring back deferred donors and minimize loss of blood donors and keep them motivated. Further studies focusing on donor Hb levels are needed to address iron depletion and anemia in prospective blood donors in this region. At the same time, there is a need to explore whether the donors deferred due to Hb levels are actually anemic or simply have an Hb level lower than that specified by the donation criteria.

The prevalence of the main transfusion-transmissible viral infections (TTVIs) in the study population were previously described by Al Shaer et al.²⁶ The individual prevalences of hepatitis B virus, hepatitis C virus, and human immunodeficiency virus per 100,000 donations were 234.4, 110, and 4, respectively. Additionally, incidence rate and estimated residual risk in the previous study indicate that the current risk of TTVIs attributable to blood donation is relatively low in the UAE.

The current study shows that deferrals due to being a high-risk donor were unexpectedly more common in repeat donors than in first-time donors. This highlights the need for further improvements of donor deferral registries and donor notification process in the DBDC to avoid recurring donation attempts among those deferred donors who are not aware of the reason for their deferral. Deferred donors might come back to donate for several reasons: 1) they might not be aware of the reason for deferral or do not understand the request for deferral – this is common among less educated donors such as laborers; 2) they might not accept the need for the deferral, believing that the test result is a false-positive; or 3) the donors might be seeking blood testing for TTVIs.²⁷

The shortcoming in this study presentation is the study type, which was retrospectively rather than prospectively planned. This limited the ability to add in ferritin measurement to gain real understanding of the deferral due to Hb level.

There is a need to assess the deferral pattern for recommending revisions in donor selection criteria as well as planning strategies for reentry of donors deferred temporarily to

be brought back to regular donor pool. Giving considerable attention to donor awards, education, and appreciation programs would further improve retention of new donors and would build up a wide database of repeat donors. Additionally, paying special attention to young, first-time donors might increase future repeat donations and provide more useable units of blood to help maintain adequate stocks. Temporary deferred donors require proper follow-up and corrective actions management to minimize loss of valuable blood donors.

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Author contributions

All authors contributed in designing the study, collecting and analyzing data, preparing the draft, and critically reviewing the final manuscript.

Disclosure

The authors report no conflicts of interest in this work.

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