Assessing the Current Standing of Hamad Medical Corporation Blood Donor Center in Qatar and Developing a Forecast Model For the Blood Stock Needs During the 2022 World Cup Event

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\section*{Abstract}
In 2022, Qatar will witness a historical event by hosting the World Cup. Qatar is expecting around 1.3 million football fans to visit Doha during this event, which requires high level of preparedness and readiness in different sectors including health care \cite{1}. Among different subsections of health, the blood bank and the Blood Donor Center will have a major role in this event especially in case of unforeseen incidences that might happen during this event \cite{2}. The blood bank should have adequate blood stocks and should stay alerted to any risk that could occur in case of any emergency \cite{3}.

A proper assessment of the current blood resource availability and a prediction of future blood needs helps in overcoming any obstacle that could be faced during the event.

\section*{Objectives}
- Highlight the Blood donation status and demands in the HMC-Blood Donor Center (BDC) over the six years.
- Develop a forecast model that predicts the number of blood donors in the next four years as a method to evaluate the readiness of the Blood Donor facility to host the world cup event.
- Assess the current standing of the BDC and explore the potential challenges that could be faced when meeting the benchmark of donation.

\section*{Methodology}
The study has been conducted in the BDC-Department of Transfusion Medicine at Hamad General hospital.

\section*{Results}
\subsection*{1. Blood donation status and demands at HMC-BDC}

\subsubsection*{1.1 Eligible donors}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1}
\caption{Blood Donation Based on Nationality}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2}
\caption{Percentage of registered Qatari versus Non-Qatari donors during 2014-2018.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure3}
\caption{Percentage of male donors versus female donors during 2014-2018.}
\end{figure}

\subsection*{1.2 Rejected donors}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure4}
\caption{Percentage of rejected donors versus eligible donors during 2014-2018.}
\end{figure}

\subsection*{1.3 Blood donation age}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure5}
\caption{Percentage of aged donors versus young donors during 2014-2018.}
\end{figure}

\subsection*{1.4 Waiting time}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure6}
\caption{Average waiting time for donors during 2014-2018.}
\end{figure}

\subsection*{1.5 Blood donation status}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure7}
\caption{Blood donation status during 2014-2018.}
\end{figure}

\subsection*{1.6 Blood donation number}

\begin{figure}[h]
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\includegraphics[width=\textwidth]{figure8}
\caption{Blood donation number during 2014-2018.}
\end{figure}

\subsection*{2. Forecasting model}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure9}
\caption{Diagnostic plot for the forecast model.}
\end{figure}

\begin{figure}[h]
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\includegraphics[width=\textwidth]{figure10}
\caption{Autocorrelation function plot for the forecast model.}
\end{figure}

\begin{figure}[h]
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\includegraphics[width=\textwidth]{figure11}
\caption{Box plot for the forecast model.}
\end{figure}

\begin{figure}[h]
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\includegraphics[width=\textwidth]{figure12}
\caption{Histogram for the forecast model.}
\end{figure}

\begin{figure}[h]
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\includegraphics[width=\textwidth]{figure13}
\caption{Normal probability plot for the forecast model.}
\end{figure}

\subsection*{3. Current standing of HMC-BDC and the potential challenges and obstacles}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure14}
\caption{Current challenges of HMC-BDC.}
\end{figure}

\section*{Conclusion}
The HMC-BDC will not be able to accommodate this increase in the number of donors with the current available facilities and infrastructure.

- Infrastructure improvements and logistics support for HMC-BDC are required.
- Action plan and future directions are needed including:
  - Increase the number off-site campaigns
  - Adapt the idea of multiple donor sites
  - Collaborate with the MOI
  - Examine donors blood samples before collection

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\section*{References}
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\cite{2} 2012 FIFA World Cup Bidding Evaluation Report: Qatar. 2010, Fédération Internationale de Football Association: Zurich, Switzerland