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Implementation of Evidence-Based Prevention and Management Guidelines to Reduce Blood Donation Adverse Reactions among Young Donors in Transfusion Medical Services, Riyadh, Saudi Arabia

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I. Introduction

Blood donation is one of the most significant contributions of people to the community, with young blood donors contributing immensely to the blood donor system (Eder 2012). According to Al-Rashdi et al. (2018), the procedure is significant in the healthcare field due to lack of a substitute for blood, especially for patients who require immediate transfusion in situationssuch as accidents, military wars, and anemic situations (p. 72).

The Blood Transfusion Service in the Kingdom of Saudi Arabia remains primarily a hospital-based banking system. These banks offer services ranging from recruiting donors until preparation, storage and issuance of blood and/or blood products. To add to this, over the years, the source of blood in the Kingdom has shifted significantly from internationally imported blood to locally enlisted blood donors (Gader et al. 2011). Nowadays, the source of donated blood remains to be a blend of involuntary donors (mainly relatives and friends) and voluntary, non-remuneratteddonors. It is however noteworthy to mention that in recentyears; a growing number of voluntary donors was noted. In particular, this increase in the number of voluntary donors is most notably seen among young Saudis aged 25 years and below (Jain and Gupta,2012).

This is further supported by other studies which state that in Saudi Arabia, several factors are imperative to why people donate blood, which is influenced by rationales such as level of education, attitudes, and societal beliefs (Al-Rashdi et al. 2018, p. 72). Nonetheless, young donors contribute the most in any blood donation exercise (Bloch et al. 2017). The group has been vulnerable to at least 54% of all adverse reactions that occur due to the donation process (Eder 2012). With these promising statistics in mind, it is imperative for the nation to look at enhancing donor safety and retention as one of its strategies to ensure that blood shortage in the Kingdom is continually and sufficiently augmented to meet the needs of its people.

Donor adverse reactions refer to severe symptoms of donor discomfort, which force the donor to look for necessary medical attention (Eder 2012). Such adverse reactions usually occur to2% to 6% ofdonors, although severe reactions resulting in loss of consciousness are rarely reported (Eder 2012, p. 14). Moreover, among other adverse reactions that happen due to blood donation, vasovagal responses have been considered as the most frequently reported reaction in diverse series (Rios et al. 2010, p. 1266). The reaction is a major hindrance to repeat blood donations, especially for young donors (Wiersum-Osselton et al. 2014). Other attributes of individuals with high chances of developing adverse reactions after a potential blood donation include donors that are low weight, female donors, and first-time donors (Rios et al. 2010; Wiersum-Osselton et al. 2014). Therefore, due to the negative impact of adverse blood donor reaction on donor retention and attainment of self-sufficiency in blood availability.

II. Background

Blood donors usually undergo the donation process effectively, although, on particular occasions, there are adverse reactions of variable severity that could happen during or at the end of the donation (Bloch et al. 2017). An adverse event is termed as the symptoms or signs of extreme discomfort that compels the donors to seek the attention of medical practitioners, or the donors were noticed to be in pain after the venipuncture. Donor reaction has the most negative influence on the return rates of blood donors, although the alleviation of some adverse events can improve the rates (Rios et al. 2010). Complications that occur during blood donation are mostly associated with the younger individuals, the first-time donation status, and the female donors

(Wiersum-Osselton et al. 2014). In addition, adverse reactions after transfusion results in fear, discomfort, nervousness, all projected to occur especially to first-time donors (Bloch et al. 2017). Therefore, such aspects resultin decreased donor returns rates as they become uncertain of potential effects .

Adverse reactions to blood donations can be described as acute after a single donation or chronic in response to long-term donation (Wiersum-Osselton et al. 2014). Severe reactions are propelled by the anxiety that occurs due to painful venepuncture and also the decline of blood volume after donation (Wiersum-Osselton et al. 2014, p. 29). More so, vasovagalreaction is a common acute reaction that occurs during and immediately after blood donation (Wiersum-Osselton et al. 2014). The reaction can progress to syncope that can cause falls injuries. The potential adverse effects of blood donation include hematomas, infection, thrombophlebitis, and damages on nerves, muscles, and tendons (Wiersum-Osselton et al. 2014). Such effects can cause immediate or long-term problems for the donor(Bloch et al. 2017). Individuals with nerve damage tend to experience numbness, weakness and intense pain. However, nerves can regenerate and heal; therefore, total recovery occurs after a long period (Eder 2012). Additionally, constant voluntary donors are prone to adverse reactions such as iron depletion.

Moreover, still on blood donation educative endeavors, adverse reactions that blood donors endure can be classified as local reactions and systemic reactions. Notably, most local reactions happen due to issues associated with venous access (Wiersum-Osselton et al. 2014, p. 30). Improper needle placement during venipunctureincreases complications; hence, exposing the donor to pain, hyperemia, and swelling (Wiersum-Osselton et al. 2014, p. 32). On the other hand, systematic reactions are triggered by the pain caused by the venipuncture, anxiety due to the donation process, the fear of a donor seeing their blood, and the tension by a donor seeing another donor unwell. Moreover, systemic reactions are characterized by dizziness, sweating, the appearance of pallor, hypotension, nausea, and gastrointestinal disorders (Eder 2012). In the occurrence of such events, medical interventions should be immediate to avoid the progression of vasovagal reactions into syncope (Eder 2012, p. 20). Ultimately, if the reactions intensify, the donor may experience sudden falls, vomiting, muscle spasms, and injuries. In consideration of the rising numbers of young blood donors in the Kingdom, it is then important to look into effective and efficient donation-related reaction prevention guidelines in order to ensure the safety of the young donors as well as to increase their retention as potential future blood-donors.

Statement of Problem

In general, blood donors do not report experiences of adverse reactions and are able to tolerate the donation process quite well. However, certain donation-related adverse reactions of varying degrees have been occasionally reported by donors during or towards the end of the donationprocedure Eder 2012. It is for this reason that the implementation of an efficient and effective, evidence-based prevention and management guidelines to reduce these reactions especially among young donors is important.

Purpose of the Quality Improvement Proposal

This proposal aims to establish concurrent prevention and management guidelines suitable to minimize the occurrence of adverse events during and after blood transfusion among young donors in Saudi Arabia through the utilization of evidenced-based guidelines.

III. Literature Review

For this review of literature, the Medline, PubMed and Cochrane databases were accessed using the keywords adverse reaction, blood donation, blood donation reactions, blood donation reaction prevention, and young blood donors. This review was limited to research studies from 2009 to 2020. The following concept categories were found: Young blood donors; causes of adverse reactions among young donors in transfusion medical services; predictors of post donation reactions among young donors; effects of post donation reactions to the retention of donors; reduction of vasovagal reactions; prevention and management guidelines to prevent adverse reactions; and increasing donor retention. A total of 10 articles were reviewed, of which 2 were cross sectional studies, 3 were quantitative studies, 1 was a cohort study, 1 was a randomized controlled trial, another 1 was an interventional study and the remaining 2 were review articles.

It is imperative to note that individuals with low circulating blood volume, high pulse rates, and increased blood pressure are highly affected by the donation of their blood if not proper measures are taken by medical experts. The young donors repeal experiencing distress and anxiety as blood is withdrawn among the first-timers (Wiersum-Osselton et al. 2014). Adverse events are also connected to hemoglobin levels that are potential factors that heighten the risks (Eder et al. 2011). In most events in Saudi Arabia, incidences of adverse events have a negative effect on the retention of blood donors (Al-Rashdi et al. 2018). Consequently, most donors usually avoid going back in the future to donate, an aspect that minimizes the blood supply available in the donation centers. Nonetheless, a low percentage of donors that encounter adverse reactions at their first

donation tend to return to the center for another donation (Eder 2012). Ultimately, further assessment is required to mitigate the occurrence of such disastrous events and also promote donor safety and satisfaction.

2.1 Young Blood Donors

Young blood donors refer to those who submit themselves to blood donation whose age is under 23 years old. In fact, blood donation advertisements targeting the younger generation have been seen on an international scale. This has become a trend for when it becomes successful, it will benefit the healthcare industry and the lives of many patients through securing blood supply through retained donors for many years (Lawrence, 2017). With the increasing trend of young donors, even as young as 16 years of age, studies on how to prevent donation-related reactions have been looked into (Newman, 2014). This may be due to the fact that higher incidences of blood donation reactions are seen in younger population. To be more specific, higher post donation reactions are seen in "young blood donors, donors with low weight and first time donors" (Almutairi, 2017).

2.2 Causes of Adverse Reactions Among Young Donors in Transfusion Medical Services

Majority of the donor reactions and a half of all recorded syncope-related medical injuries are experienced by young adults and adolescent blood donors (Bloch et al. 2017, p. 1). Cases of vasovagal reactions are apparently high in first-time donors, which gradually becomes less in incidences of repeat donations (Wiersum-Osselton et al. 2014). Adverse reactions among young donors can result from needle-related medical problems, resulting in reactions that are associated with vasovagal complications (Wiersum-Osselton et al. 2014). Such reactions can cause pre-faint cases and momentarily loss of consciousness (Rios et al. 2010, p. 1266). Conversely, research indicates that a small percentage of donors experience bleeding and bruising at the venipuncturesite, unconsciousness, dizziness, nausea, fainting, and convulsions (Eder 2012, p. 18). However, most cases of first-time blood donors go well with several blood donations tending to be uncomplicated with no adverse effects and discomforts.

It is imperative to note that causes of adverse reactions among young donors in transfusion medical services are mostly devoid of indicators such as height, sex, race, donation site, and blood center as causative agents (Rios et al. 2010, p. 1265). Factors that are major contributors to such adverse effects include estimated blood volume (EBV) of the donor, young age as well as the number of previous blood donations (Rios et al. 2010, p. 1265). According to the research conducted Rios et al. (2010), donors who happened to have less than 3.5 liters of measurable EBV experienced 12.5% of pre-faint cases and a higher amount of 14.5% of systemic vasovagal reactions (p. 1265). In a similar study, Bloch et al. (2017) deduced that young donors experience post-donation complications such as dizziness and phlebotomy site's localized bruising due to iron depletion in their bodies. Syncope-related complication and medical injuries due to depletion in iron in the body causes cases of facial lacerations, head and dental injuries, as well as fractures for young donors (Bloch et al. 2017). Ultimately, it is imperative that such causes of adverse reactions among young donors in transfusion medical services are checked properly and their likelihood studied to reduce their cases for first-time donors.

2.3 Predictors of Post Donation Reactions among Young Donors

Despite the relatively low occurrence of blood donation related incidences, literature on its nature and severity has been reported. These reactions are generally reported as vasovagal in nature or as hematomas (Almutairi, 2017). One study in particular asserts that the occurrence of post donation incidences as well as its nature may be associated with the overall condition of the donor. Specifically, the following predictors have been identified: age (young), low body mass index (BMI), high blood pressure, fast pulse rate, first-time donation, small circulating blood volume and short sleep time (Almutairi, 2017). Moreover, it has also been noted that certain psychological conditions also may predispose a donor to post donation related reactions. These psychological conditions include feelings of distress as well as anxiety which are especially high in first-time donors. With these studies, one can safely assimilate that it is important to establish mechanisms on how to prevent various post-donation reactions to increase retention of donors. Studies reveal that a significant proportion, about 9%, of the donors who experienced varying degrees and nature of adverse reactions no longer came back as returning donors. If this is not addressed accordingly, this may eventually cause potential shortages in blood supply.

In several studies conducted, the incidence as well as the severity of these donation-related reactions seem to be indirectly proportional with the donor's age. In fact, in one study conducted in King Abdulaziz Medical City, it was seen that about 40% of their donors who experienced severe post-donation reactions were aged 30 years old and below. Moreover, in the same study, the researcher also noted that about 50% of the donors with hemoglobin levels of between 12.5 – 13.0 g/dl also experienced severe post-donation reactions. Still in the same study, it was also noted that donors with normal blood pressure as well as those whose blood pressure were slightly elevated to the point of pre-hypertension were at lower risk of post-donation reaction. On

the other hand, donors with weight of less than 75kgs were also noted to have higher probability of experiencing severe donation-related reactions. Lastly, those with previous experiences of blood donation were also seen to be at higher risk of developing donation-related reactions (Almutairi, 2017).

In another study, it was noted that body size, as measured by estimated blood volume (EBV) calculations and less well by body mass index or weight, is the second most important risk factor (Newman, 2014). In Hong Kong, a study revealed that donors whose weight is more than 50kgs may donate blood with volumes ranging from 350 up to 450ml. In the same study, women who chose to donate within the said range experienced lesser post-donation reactions. Specifically, the reduction in the adverse reactions was noted to be between 35 to 58%. In men on the other hand, those who chose to donate 350ml of blood experienced a reduction of about 41 to 45% of post-donation reactions (Newman, 2014).

Another important discovery in terms of risk factors that could increase one's predisposition in experiencing donation related adverse reactions is the duration of phlebotomy. In fact, a study conducted in 2006 whose population sample consisted of 17 year-old, Caucasian first-time donors revealed that the longer the duration of the phlebotomy, the vasovagal reaction rate also increases. Specifically, the vasovagal reaction rates in among women changed from 7.1% t 4 minutes' duration to 14% at 9 minutes of phlebotomy duration. For men on the other hand, the same result was also noted. The vasovagal reaction rate also increased from 4.3 at 4 minutes duration to 9.0 at 9 minutes phlebotomy duration. It is however important to mention that the reason why phlebotomy duration affects vasovagal rates still remains to be unknown (Newman, 2014).

Another risk factor that may be taken into consideration in terms of predicting the occurrence of post-donation reactions and its severity is the sleep duration of the donors. In a study conducted in Japan with at least 45,000 sample size, it was noted that the lesser the sleep duration of the donor, the higher the probability that they will experience varying vasovagal responses. In particular, about 30% of the donors who experienced various vasovagal reactions had less than 6 hours of sleep. This is true in both men and women (Newman, 2014).

2.4Effects of Post-Donation Reactions in Retention of Donors

Vasovagal reactions are truly uncomfortable experiences for donors from all walks of life and age ranges regardless of their overall health conditions. It is because of this that the retention rates of returning blood donors also tend to decrease (Newman, 2014). In a study conducted by Eder et al (2008), it was noted that blood donor return rates decreased by 29 to 37% due to pre-syncope reactions or reactions that does not involve any degree of loss of consciousness. For syncope reactions on the other hand, a reduction of 58 to 78 percent was noted. In addressing, much more preventing future occurrences of these vasovagal reactions, the staff responsible in collecting blood should be equipped to identify and study vasovagal reactions. In this regard, it is important to note that the most important tool that can be used to accomplish this is observation and recording of reactions and is to be done diligently and accurately by the blood bank staff performing the blood collection. The reaction's occurrence, the location of the reaction's occurrence, the donor's demographics, the symptoms and signs, the presence of syncope, prolonged recovery, presence of injury, and applied interventions to prevent reactions are variables that can be captured and studied (Newman, 2014). In fact, the AABB National Donor Biovigilance and the International Society of Blood Transfusion's Committee developed objectives and useful categories to assist in better understanding and comparison of these data. These observations can be further supplemented by donor interviews and written self-assessments of donation reactions that were experienced by the donors. In studying therefore, the efficiency of certain preventive measures against donation related reactions, donor interview of up to 3 weeks post donation may prove to be a useful measure.

2.5 Prevention and Management Guidelines to Prevent Adverse Reactions

The prevention of adverse reactions and the increase of donor retention in transfusion service centers is determined by measures of minimizing the reaction rates, establishing self-efficacy, and the provision of excellent blood donation experience.

Furthermore, the majorityof first-time donors have lower refusal rates for water and exercises recommended to ease their blood donation process (Wiersum-Osselton et al. 2014). On the other hand, repeat donors have experience in the process, an aspect that compels them to skim educational materials provided before the donation process, and they disregard advice offered by the blood collection staff as they perceive that they risk level is considerably low (Wiersum-Osselton et al. 2014). In most instances, young donors have low return rates, especially if they experience adverse reactions after the donation process (Eder 2012). Therefore, it is essential to provide reading materials and offer a checklist with the intent of optimizing their donation experience and preparing them for potential adverse reactions.

Riyadh's centers of blood transfusion should consider encouraging their donor base to eat healthily, and get enough sleep in order to enhance blood flow rates (Abolfotouh 2014). The approach also minimizes their vulnerability to adverse reactions. At the blood drive centers, the donation process should commence by

the recognition of all donors as the most important individuals in the environment and ascertaining to them the significance of the donation to the community (Abolfotouh 2014. All young donors should be enlightened of the preliminaries of the donation process to ensure that they are conversant with all required procedures (Eder et al. 2011). All educational materials offered at the transfusion centers should explain the blood donation process, highlight the donor's inquiries, common factors that trigger fear, offer information to promote self- regard and the issues such as the confidentiality of the blood test results (Eder et al. 2011). A detailed data on the materials gives (the donor sufficient information and augments their accessibility via audio-visual media). The platforms can be used to communicate with donors in the future (Al-Rashdi et al. 2018). Conversely, not all donors consider utilizing the pre-donation materials; hence, the blood donation staff can consider engaging the donors to ensure that they have sufficient knowledge to make informed intervention decisions.

2.6 Reduction of Vasovagal Reactions

American Association of Blood Banks (AABB) has established a working group that was given a mission to reduce vasovagal reactions and injuries among young blood donors, adolescents in particular. In this mission, the members of the workgroup were able to identify 5 processes in the whole donation process that should be looked at in terms of reducing the probability of the occurrence of donation-related adverse reactions. These processes include: (1) pre-donation education – health education provided to potential donors several days prior to the scheduled donation to prepare them physically and psychologically for the whole donation process; (2) the area situation; (3) staff monitoring and capability; (4) actions; and (5) treatments after the reaction occur and guidance. In the same light, this same workgroup also proposed that the following approach may also prove effective in reducing donation-related reactions: dividing the whole donation experience into 3 phases: (1) preparing the potential donor psychologically through provision of relevant and sufficient health education; (2) preparing the potential donor physically through proper instruction in terms of diet, sleep and other relevant lifestyle risk factors that may increase their predisposition to experience various vasovagal reactions; and (3) enhancing donor behavior and developing the procedure to avoid vasovagal reactions and maximize donor engagement.

Psychological preparation for potential donors may come in varying forms. In fact, older studies show that a talkative phlebotomist with good interactive skills, the presence of social support system for the donor during the entire duration of the donation process as well as various forms of distraction may reduce anxiety and thereby decrease the likelihood of the the occurrence of various vasovagal reactions related to blood donation (Newman, 2014). It is however important to note that including fear-related questions when preparing potential donors psychologically may decrease rather than increase donor reactions. In the same light, including these fear of blood donation and any untoward reactions that may arise from the process may also reduce donor retention rate. Specifically, those who expressed anxiety in this experiment had a greater chance of vasovagal reactions whereas those who did not express anxiety. A study was done among high school students, the researcher observed that anxiety is a strong indicator of positive vasovagal reactions (Newman, 2014). In addition, those who displayed anxiety had double the rate of vasovagal reaction opposed to those who were not anxious. The same findings were found in first time donors as well as in repeat donors. It is therefore safe to conclude that the stronger the fear, the higher the vasovagal reaction rate that we can expect from the blood donors. In view of these findings, various techniques have been looked at in an attempt to reduce the fear experienced by potential blood donors. These techniques include but not limited to enhanced donor recruitment brochures, use of videos, improved web advertisements through enriched information. An enhanced brochure more specifically and directly reviewed common donor concerns and barriers such as fear of pain, arm injury, being weak, and the possibility of a vasovagal reaction. It proposed verified empirical behaviour that included fluid balancing, muscle soreness, and relaxation strategies to comply with vasovagal reactions. The impact of the brochure were assessed objectively on more than 180 university students and contrasted with a regular brochure or an un-relevant brochure. In this study, it was revealed that the new brochure increased the blood donor's confidence in their ability to endure the whole blood donation process and has increased their willingness to donate (France et al, 2008).

In another study, the use of the same enhanced brochure completed by the use of visual aids, video in particular, was tested to increase donor recruitment among 599 college students. These techniques significantly showed reductions in the potential donor's anxiety, improved their attitude and confidence towards blood donation which in turn increased their willingness to donate blood.

Several studies evaluated various interventions that aided in preparing potential blood donors physiologically. These interventions included donor selection, water fluid preloading within 30 minutes before the start of the process and muscle tension in young whole blood donors. Elder et al (2008) cited in their study which involved a comparison of over 754,000 whole blood donations from donors whose age falls between 16 to 18 years old. In this study, the donors and their parents were given pre-donation materials, were encouraged to drink about 16 ounces (473ml) of water before the donation process and were instructed to do leg lifting

during donation as a way of muscle tension. Furthermore, to support these acts, the blood bank administration also issued a standard work guideline for staffing levels. Finally, the blood bank administrations concealed the venipuncture areas from donors ' sight. These combined efforts to prepare donors and decrease the chances of vasovagal reactions have proven to be successful in that there has been a continuous decrease in the reported incidence of vasovagal reactions among the young blood donors involved in the study (Elder et al, 2008).

Lower-body muscle tension function is to drain the blood from wide-capacity veins into the heart, thereby improving the cardiac output as well as the stroke volume (Newman, 2014). In fact, in several studies conducted, the effects were almost immediate, occurring after 2 to 3 seconds. This allows muscle tensing of the lower extremities to be used as a preventive measure against donation-related vasovagal reactions during the duration of the donation process. Consequently, it can also be used as part of the management of donors who later on experience mild vasovagal reactions such as dizziness (Weiling et al, 2011). The said muscle tensing activity should be encouraged among blood donors before leaving the bed for it apparently increases the flow of blood to the heart thereby addressing any feelings of lightheadedness or dizziness.

Another intervention which can be done in conjunction with the other aforementioned measures to prevent the occurrence of donation related vasovagal reactions is the consumption of hypotonic water prior to the start of the donation process. Specifically, consuming about 16 ounces (473ml) of hypotonic water within 45 to 60 minutes before the beginning of the donation has been proven to reduce about 16 to 21 percent of the vasovagal reactions seen in high-school donors (Eder et al, 2011). Studies reveal that the water-load mechanism may prove to be effective because of its gastric distension effect as well as its effects to the osmoreceptors in the portal circulation. Once the stomach is stretched, this leads to the stimulation of a sequence of events starting from firing sympathetic discharges resulting to peripheral vasoconstriction. This in return lessens the blood flowing to the extremities while allowing more blood to flow in the central organs of the body. This mechanism maintains blood pressure thereby preventing some of the vasovagal responses.

2.7 Increase Donor Retention

Overall, the transfusion service centres should maintain a consistent staffing level to eradicate or minimize the donor waiting period. The staff members should be equipped with the knowledge to respond to all inquiries presented by the donors (Abolfotouh 2014). The convenient placement of the staff group prevents delays that may tamper with the donor's flows. According to Rios et al. (2010), the consideration of staffing levels, as a donor incentive measure, is significant as the wait time is usually a major factor that determines the success of the donation process and the blood donor return rates. All nurses and phlebotomists in the transfusion centers should be knowledgeable of the risk factors associated with blood donation (Abolfotouh 2014). The perspective ensures that adverse reactions are anticipated before the donation process.

Moreover, the presence of visual illustrations on the risk factors can be posted at the transfusion centers to ascertain the affiliation of haemoglobin levels and the occurrence of adverse reactions. According to Abolfotouh (2014), in central Saudi Arabian cities, revised policies should be established at the blood donation centers to promote staff compliance. All adverse events should be documented conveniently to ensure that the quality indicator is compared with the set transfusion standards. Intervention measures are adopted and incorporated to reduce or mitigate unfortunate incidents. Blood donation is a safe approach that could be made the event free through the endorsement of friendly, supportive, and considerate practices (Abolfotouh 2014). Conclusively, blood transfusion centers in Riyadh should constantly assess adverse reactions that occur due to blood donation and try to make a steadfast effort to record low rates of such donor-related complications.

In summary, the literaturesupports that donation-related reactions are potential causes of harm to the donors in the Kingdom. It is then imperative that healthcare providers stationed in blood banks providing care to blood donors implement and follow evidence-based donation-related preventive guidelines. This will not only ensure the safety of the donors but potentially increase donor retention as well. Preventing the donors from experiencing untoward reactions will most likely encourage them for subsequent blood donations.

Quality Improvement Framework This quality improvement project will utilize the Plan, Do, Studyand Act (PDSA) framework to guide the implementation of evidence-based prevention and management guidelines in order to decrease blood donation adverse reactions among young donors.

The Plan-Do-Study-Act (PDSA) is a process that employs repeated cyclical operations to achieve a targeted result. It is supposed to be convergent in principle that the outcome should come closer to the desired result as the number of iterations (cycles) increases. This is made possible by its use of a systematic approach that involves testing possible improvement initiatives and implementing the ones identified effective in achieving the desired outcome. It is for this reason that this process is often used for improving processes, services and even in resolving challenges or problems (American Society for Quality, 2020).

In view of the benefits of this cycle, particularly as a means of achieving the primary objective of this quality improvement proposal which is to establish concurrent prevention and management guidelines suitable

to minimize the occurrence of adverse events after a blood transfusion among young adults in the Saudi healthcare setting, this framework was selected.

In the PLAN phase, the existing practices in terms of blood donation and management of blood donors will be looked at. This includes care provided before, during and after the blood collection process. This will allow an avenue to identify potential points for improvement particularly in establishing an efficient and effective preventive measure/guideline in reducing blood transfusionreactions. In this phase of the cycle, certain stakeholders will be involved. This will include representatives from nursing, medicine, laboratory, donors and key administrators/executive officers who are involved in writing and approving necessary regulatory documents to implement the proposal. This team will be responsible in identifying evidence-based practices that may be written as a policy to be implemented in preventing donation-related reactions among donors. After completion of the guidelines, blood bank staff will be informed through a series of awareness and educational activities that will involve demonstration and return demonstration of the skills necessary in implementing the guidelines.

In the DO phase on the other hand, the identified potential preventive measure/guideline in reducing blood transfusion reactions will be implemented in select cases. Metrics to measure the impact of these preventive measures will be established.

In the STUDY phase, a continuous metric monitoring will be done to identify whether the preventive measure is effective. This will provide an avenue to make necessary revisions to improve and further enhance the identified preventive measures.

In the fourth phase, ACT, the sustainability of the intervention will be monitored.

IV. Methodology

Conceptually, this study zeroes in on the assessment of evidence-based prevention and management frameworks that can be integrated to minimize the rate of adverse reactions among young donors donating blood in transfusion medical services of Riyadh, Saudi Arabia.

PLAN. For this Quality Improvement Proposal therefore, several stakeholders will be involved. This includes representatives from the following fields: nursing, medicine, laboratory, donors and key administers/executive officers who are involved in writing and approving necessary regulatory documents to implement the proposal. These representatives will form a committee and they will be responsible in identifying key practices that may be written and drafted as guidelines that when implemented may reduce donation-related reactions. Furthermore, this committee will also be responsible in monitoring the effects of the implementation of these guidelines.

DO. The implementation will commence through electing potential committee members. Committee members shall include, but not limited to, nurses involved in the blood donation process, physicians, phlebotomists, laboratory specialists and other healthcare personnel who are involved in the donation process and may have valuable contribution to the development of donation-related prevention guidelines. Upon completion of the required members, a committee formation order will be drafted and agreed upon by all the members citing their roles and responsibilities as members of the committee. The committee formation order shall be submitted for approval as per institution policies and procedures to promote and ensure engagement and commitment of all nominated and selected committee members. The said committee will hold periodic meetings where they will sit and identify essential measures that may be collectively written and included as preventive guidelines in reducing donation-related reactions. The committee members will start by reviewing the "Recognition and Handling of Blood Donor or Apheresis Reactions" (Appendix A) regulatory document from King Abdulaziz Medical City (Appendix A) as the primary basis in developing guidelines in the prevention of donation-related reactions. Furthermore, the committee may also opt to integrate various physiologic and psychological preparations to the blood donors as part of the preventive guidelines. The committee will further design brochures that will target the education of the blood donors particularly outlining the basic information regarding blood donation, what they can expect from it and what they need to do to prepare themselves in the process.

Upon the committee's decision, with all the revisions and enhancements of the guidelines together with all the materials that will be used in educating the potential donors as well as other documents deemed necessary and beneficial, it shall be submitted to the institution for further review and approval for implementation in the blood bank where blood donation services are offered.

Prior to its implementation, all healthcare providers involved in the blood donation process shall receive comprehensive education and training to ensure their understanding as well as compliance to the guidelines to be implemented. This education will include how to prepare potential donors, how to assess, record and understand donation-related reactions and management of these reactions if any will ever occur to the donors during the blood collection process.

STUDY. The following metrics will be measured to monitor for the impact or improvement brought about by the implementation of the guidelines: number of reported donation-related adverse reactions among young donors; and retention rate of young donors. These metrics will be measured on a monthly basis, with data collection to be performed every last Thursday of every month. The First cycle of the implementation (DO-STUDY) phase of the Quality Improvement Project will be 6 months and after which, the guidelines will be revisited by the committee members and revised as deemed necessary.

Concurrent to the monitoring of the above stated metrics, compliance rate of the healthcare personnel involved in the blood collection process will also be monitored. This is to ensure that the guidelines are implemented and followed in every patient that comes to the blood bank for donation.

To support the quantitative data, patients who meet the population criteria will also be interviewed for their blood-donation experience. Post-donation reactions will also be assessed through donor follow-ups within two weeks post donation. Results of these interviews will be collected, collated and reviewed by the committee members to be considered in the revision of the Donation-Prevention Guidelines. This does not only allow improvement of clinical practice but also increase patient satisfaction in the process.

This improvement proposal will be done within 6 months per cycle and will not require any budgetary allocations.

3.4 Ethics Planning and Implementation

Ethical approval will be applied for to the Institutional Review Board (IRB). Approval of the implementation of the preventive guidelines in reducing donation-related services among young donors in the Kingdom will serve to ensure the safety of the donors.

This proposal will be submitted to the IRB of the institution where the guideline will be developed and implemented. On approval of the project by the IRB, a memorandum of agreement between the institution and the author of the proposal will be drafted and approved by both parties. The agreement will contain information on the scope and duration of the quality improvement project. Furthermore, consent for participation shall also be obtained from willing young blood donors who will be participating in the study. Young blood donor population includes Saudi donors, male and female, aged 16 to 25 years old. The consent will include a concise description of the process to be done supplemented by a verbal explanation. This is to ensure that the participants fully understand the process to help them arrive at an informed decision whether or not they will participate in the proposal.

V. Data Analysis

This section will cover the evaluation of the impact of the guidelines in the prevention of donation-related reactions among young Saudis. Improvement will be measured through looking at the number of donation-related reaction incidences as well as donor retention rate. These metrics will be measured before the implementation of the guidelines. This pre-implementation data will be used as the baseline to which improvement will be measured. In the same manner, the metrics will be continuously measured on a monthly basis. Data will be gathered through reviewing patient's medical records, the blood bank's electronic database and patient satisfaction survey. Data gathering will be done every last Thursday of every month over the 6 months' implementation period to include all young donors aged 16 to 25 years old. Depending on the progress of the quality improvement, the guidelines will be continuously revisited and developed following the PDSA cycle. Towards the end of the implementation, sustainability will be achieved through embedding the guidelines in the blood bank policies and procedures supplemented by comprehensive awareness and education to blood bank personnel. This will be ensured through continuous monitoring of the metrics on a quarterly basis post implementation.

DISCUSSION

The discussion will analyze the existing information that is within current literature encompassing evidence-based prevention and management guidelines applicable in reducing blood donation adverse reactions among young donors in transfusion medical services, Riyadh, Saudi Arabia. Application of the PDSA framework will be used to analyze such guidelines and evidence-based prevention measures in relation to the study objectives and research questions.

he most effective approach to managing adverse reactions is by hindering them from happening at all. While the blood donation process is one of the safest healthcare processes, blood transfusion centers should have a detailed protocol that examines preventive measures that make donors vulnerable to the risk of adverse reactions (Rios et al. 2010, p. 1268). Moreover, the blood collecting medical equipment's procedures as well as the medical staff should enforce different approaches in response to adverse donor reactions (Rios et al. 2010). In most instances, the blood collection staff consider mild approaches such as loosening the donor's clothes, reclining their positions during the procedure, and placing cold surfaces on the donor's neck, although these

measures have no huge difference in managing the reactions (Mostafa, Youssef, &Alshorbagy 2014). Most adverse reactions from blood diffusion tend to clear on their own after a certain period, for example, within an hour for mild reactions and a day or two for severe reactions (Eder 2012). However, it is the approaches incorporated to enlighten donors on the reactions that enable them to adopt effectual coping mechanisms and consider donating in the future.

Implications for Practice

The study will have both negative and positive implications for blood-donation practices. Firstly, educational materials should be considered as part of the donor's consent process, and they have a significant impact if they are designed for the young population, and they exemplify age-appropriate language and graphics. Major elements that should include in the material include the general statement that a high percentage of donors have normal donations, and in case of any reactions, they happen to be minor. (Rios et al. 2010). Transfusion medical services have a primary role in ensuring the safety and wellbeing of the donors. More so, they should focus on minimizing adverse reactions among young blood donors. Secondly, another legal implication should be the fact that the different donor groups that could be highly susceptible to reactions need knowledge prior to donations, for instance, young individuals, people with low blood volume ? females and first-time donors. In addition, the individuals should be educated on the reasons that make them vulnerable to the risks (Wiersum-Osselton et al. 2014). The medical statements should also offer a summarized depiction of the donation processes to enlighten the first-time donors of the donation procedure and also eradicate potential anxiety of the procedure (Mostafa, Youssef, &Alshorbagy 2014). Also, the information should outline potential approaches that hinder intense reactions and improve coping skills while providing a comprehensive explanation of prospective benefits of endorsing the techniques. This could be reinforced by developing comprehensive but easy to understand educational materials to increase the understanding of the donors on potential donation-related reactions as well as on how to prevent them. By incorporating this in the process of securing consent, the donors are able to better prepare themselves for the procedure thereby decreasing the likelihood of donation-related reactions to occur as well as increasing the chances of returning as potential regular blood donors.

Overall, the statement should depict the transfusion center's blood collection policies on donor's consent and confidentiality on their test results. It is prudent to assert that voluntary young donors must be retained and encouraged to become regular donors, in order to save lives of people in need of blood transfusions. Such an approach into blood transfusion services improves the intent of augmenting the availability of donor units in Riyadh's blood banks. Techno-savvy inventions, such as smartphone applications and the use of social media, should also be utilized and introduced into the business of blood transfusion in order to aid in its operations (Mostafa, Youssef, &Alshorbagy 2014). Such impressive innovations have been noted to have limited use by the occurrence of adverse reactions in blood donors after the donation process (Eder et al. 2011). Such innovations should be used to both educate and share knowledge among young donors about the intricacies of blood transfusions. Education can centre on why cases of vasovagal reactions are apparently high in first-time donors, which gradually becomes less in incidences of repeat donations (Wiersum-Osselton et al. 2014). In addition, young donors can be enlightened on the adverse reactions resulting from needle-related medical problems, as well as cases resulting from reactions that are associated with vasovagal complications (Wiersum-Osselton et al. 2014). In the end, positive message should be shared, for instance, the research projections that indicate that a small percentage of blood donors typically experience bleeding and bruising at the venipuncture site, unconsciousness, dizziness, nausea, fainting, and convulsions (Eder 2012, p. 18). Ultimately, while blood donation has a relatively minimal risk rate, and donors are subjected to detailed screening for contraindications before donation, there are adverse events that may occur during and after the process.

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