QUALITY ASSURANCE OF BLOOD BANK PERFORMANCE IN ZAGAZIG UNIVERSITY HOSPITALS

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ABSTRACT

Background: Blood bank has to ensure availability of a sufficient supply of high quality blood and blood components for transfusion with maximum efficacy and minimum risk to both donors and recipients **Objectives**:1- diagnosis of defects in different procedures of Zagazig University Hospitals Blood Bank in relation to standards concerning donor selection process, nurses performance during blood donation, refrigeration status, transportation of blood bags from one bank to another and to hospital wards.2-Increase orientation and knowledge of staff concerning standards and plan to improve one selected defective procedure. 3-Reassess the improvement plan **Methods** : The study was conducted in Zagazig University Hospitals Blood Bank on 384 blood donor in the 1st phase and 354 in the third phase using structured checklists guided by WHO standards about blood banking procedures, also the study was conducted on 232 blood bag issued from the bood bank to other hospital ward clinical areas and 57 transportation maneuver from Zagazig University Hospitals Blood Bank to other blood bank transported in the first phase. **Results**: It was found that the refrigeration status was satisfactory reaching 60% in relation to standards, labeling blood bag was perfect by 100% except a deficient written blood expiry date, ABO grouping and Rh typing were performed to all blood bags and 100% of the bags were labeled with it, 87.7% of blood transported from blood bank to another were transported in insulted container, while 100% of blood transported from blood bank to hospital ward clinical areas were not transported in insulated box. Only 6.7% of donors was lucky that the nurse was wearing gloves. Washing hands, alcohol swabs, changing gloves were not performed by nurses in 100% of donors. Significant improvement in the knowledge of blood bank nurses concerning history taking , examination, disinfection, storage and transport of blood bags occurred after intervention. As for deferral rate it was increased from 2.6% in pre intervention phase reaching 15.8% in post intervention phase which was statistically high significant. There was significance difference between pre and post intervention mean score of history taking and examination procedure. **Conclusion**: Appropriate donor selection is an important step in ensuring safe supply of blood .

INTRODUCTION

Quality assurance deals with the maintenance of a system to ensure that the performance in that system is of the required quality. In a blood transfusion centre, it means that a management system should exist to look into provision of a safe unit of blood and, if any errors are identified, they should be corrected (1).

Quality has been central to blood banking from its inception. Over the ensuing decades, continuous scientific progress in blood preservation, filters, viral and blood group testing, cross matching, automation, and computerization including bar coding, etc. has contributed to the quality and safety of the blood products and transfusion service(2).

Appropriate selection of donors , use of sensitive screening tests and the application of mandatory quality assurance system are essential to maintain the safety of blood supply**(3).** Blood Bank in Zagazig University Hospitals give 7780 blood packs per month to patients in spite of this, the bank has no formal standard operating procedure. Studying the whole process is needed for quality assurance and quality improvement.

SUBJECTS AND METHODS

The study was intervention field trial, conducted in Zagazig University Hospitals Blood Bank in 2010 in 3 phases.

Subjects:

- All actively working doctors in Blood Bank (4), nurses (16) , technician (16) and (2) security men.
- 385 Blood donors attended the blood bank for donation in the first phase of study and another 354 attended the bank in the 3rd phase. 232 blood bag transported from the bank to other clinical areas in the first phase. 57 transportation maneuver of blood bags from Zagazig University Hospitals main Blood Bank to other blood bank of Zagazizig University Hospitals (in the first phase).
- The necessary official permission was taken also an informed verbal consent was obtained from whom shared in the study. They were reassured about the confidentiality of any obtained information.

Methods:

Phase I: Situation analysis phase to define the defects in the different processes of blood bank through :

- Assessing the process of donor selection using Donor history and examination checklists structured by the researcher guided by Standard Operating Procedures (SOP 1) for blood transfusion service published by WHO 2002(4).Three items from Standard Operating Procedures (SOP 1) were excluded concerning sexual history which was against our culture, one item was added which asked about menstruation as whole-blood donation harms menstruating females by Iron depletion(5).
- Assessing the performance of nurses during donation process using venepuncture site checklist and Bag procedure checklist structured by the researcher guided by WHO 2002(4).
- Assessing the performance of technicians after collection of blood using After collection checklist structured by the researcher also guided by WHO 2002(4**),** serological testing were excluded as it was not the point of our research.
- Assessing the refrigeration status and the process of transportation of blood bags from one bank to another and from the bank to hospital wards using Refrigerator status checklist and Transport checklist respectively structured by the researcher guided by the Manual on the management, maintenance and use of blood cold chain equipment published by WHO 2005(6).
- Assessing knowledge of staff about standards of different processes using Doctor knowledge sheet, and nurses and technician knowledge sheet which are structured by the researcher in relation to the above standards.All standards which had been written in English language were translated, revised and validated.

All defects which were detected in this phase are represented in fishbone figure (1) Donor selection process was selected for correction because we have to start with a healthy donor to guarantee that the subsequent steps will be based on sound base. It is easy to be improved and Its outcome can be measured.The defects in history taking and examination scored high prevalence where 93% of Blood donors history taking episode got a total score below median in donor history questionnaire and100% of Blood donors examination procedure episodes got a total score below 25% in donor examination procedure. Donor safety builds trust in the blood bank and encourage donor satisfaction.

Phase II : An intervention field trial was performed upon:

- Improving the knowledge of staff concerning standards for donation –storage - transport process via Heath education sessions through personal interviews and small group discussion using booklets about standards of donor selection, disinfection, storage, and transport of blood bags and dissemination of standard procedures using a large explanatory panel (150 cm x 80) cm in the donor area showing the criteria for donor selection and two explanatory panels (60 cm x50) cm in the donor area and at the issue window

showing steps of disinfection and storage – transport standard conditions.

- Improving donor selection process using formal format containing donor history questionnaire structured by the researcher to be applied in the blood bank. Approval was obtained from blood bank manager for this format to be used by workers in the donor area.

Phase III: Evaluation phase to measure the effect of intervention through:

- Reassessing knowledge of staff about standards of different processes using Doctor knowledge sheet, and nurses and technician knowledge sheet and comparing these post test results with the results of pre test.
- Reassessing the process of donor selection using Donor history checklist and Donor Examination checklist and comparing the pre and post checklist results.

Data management and statistical analysis:

Scoring system:

- Donor history checklist consists of 6 main questions if the donor is male, 7 if the donor is single female and 10 if the donor is married female. If the question is asked it takes (1) , if it is not asked it takes (zero) Examination checklist consists of 8 items, venepuncture site checklist consists of 10 items, bag procedure checklist consists of 6 items , after collection checklist consists of 3 items, scoring of each item is (zero) If not done, (1) If not properly done,(2) If properly done.
- Refrigerator status checklist consists of 8 items, scoring of the first two items is if not present it takes zero if present and not working it takes (1) and if properly working it takes (2) , scoring of the remaining 6 items if yes it takes (2) and if no it takes (zero) .
- Scoring of transportation from the bank to another bank or to hospital ward is (zero) If not done, (1) If not properly done,(2) If properly done .
- Knowledge sheet consists of 4 main items, each right answer scores (1). Donor history knowledge (16) questions, examination knowledge (5) questions, venepuncture site preparation knowledge (7) questions and Storage and transport of blood bags knowledge consists of (5) questions.

Statistical analysis:

The collected data were entered, analyzed by computer using SPSS version 14 statistical computer program. Chi square test was used for comparison of qualitative data, T test was used for comparing quantitative data and Paired t test was used for comparing pre and post intervention concerning knowledge of staff. The results were considered significant at p- value $\leq$ 0.05.

RESULTS

Table (1)shows that there was high significant difference between pre and post mean score of nurses and technician knowledge concerning history taking, examination, disinfection and storage and transport of blood bags

Table(2) shows that there was high significant increase in the percentage of blood donor deferral after intervention than before it.

Table (2) shows also that there was high significance increase in the causes of deferral other than being not well after intervention. The most prevalent causes of donor deferral in post intervention phase were due to recent donation (22.8%) then hypertension (14%)

Table (3) shows that there was high significant increase in post intervention score than before it in history taking where the mean percentage score before intervention was 25.3% reached 65.1% after it.

Table(3) shows also that there was high significant difference between pre and post intervention where mean percentage score of examination was 8% and reached 36% after intervention

It was found also that the refrigeration process was satisfactory by 60%, labeling

blood bag was perfect by 100% except a deficient written blood expiry date, ABO grouping and Rh typing were performed to 100% of blood bags and the bags were labeled with it, 87.7% of blood transported from blood bank to other bank were transported in insulted container, while 100% of blood transported from blood bank to hospital wards were not transported in insulated box. Only 6.7% of donors were lucky that the nurse was wearing gloves. Washing hands, alcohol swabs, changing gloves were not performed by blood bank workers in 100% of donors.

Table (1) Showing change in nurses and technicians knowledge

Studied items	Total score	Nurses Knowledge		Technician Knowledge	
		Pre mean score	Post mean score	Pre mean score	Post mean score
History taking	23	14.5±2.394	22.31±0.946*	14.3±3.72	23±0.00*
Examination	9	4.56±1.632	8.38±0.885*	5.81±1.87	9±0.000*
Disinfection	7	4.19±1.223	7±0.000*	4±1.095	7±0.000*
Storage and transport	5	2.06±1.124	4.63+0.5*	2.69±0.70	5+0.000*

*P<0.01

Table(2)Blood Donor Deferral before and after intervention

	Pre intervention	Post intervention	Chi Square	P
	N=384	N=354		
Deferral				
Deferred (%)	2.6	15.8	40.65	0.000*
Donated (%)	97.4	84.2		
	N=10	N=57		
Cause of deferral				
Looks unhealthy(%)	100	12.3	34.57	0.000*
Other causes (%)	0	87.7		

*P<0.01

Table(3) Showing change in mean of percentage score of blood donor history taking and examination before and after intervention

	Pre mean % score (N=384)	Post mean % score (N=354)	t test	P value
History taking	25.3±16.8	65.1+39.5	18.04	***0.000**
Examination	8.89±5.67	36.93±3.73	74.77	***0.000**

*P<0.01

DISCUSSION

It has long been recognized that blood bank institutions have an obligation to not only provide a safe product for patients, but also to protect the health and welfare of their donors (7).

Appropriate donor selection is an important step in ensuring safe supply of blood and blood products (8).

The present study was conducted in three phases in a trial to improve donor selection process and improve knowledge of staff of Blood bank in Zagazig University Hospitals It was found that there was improper performance in the Blood bank procedures where there was low blood donor deferral rate due to defects in History taking and donor examination also there was a defect in disinfection procedure and transport of blood to other blood bank and to clinical areas.

Wake and Cutting , 1998 found that economic constraints limit blood supply safety where HIV and hepatitis transmission through blood transfusion is a major concern in developing countries(9) .

In another study in Strasbourg blood service in France reported significantly higher numbers of abnormalities were found in intermittent as compared to regular blood collectors and in senior as compared to new collectors. The applied corrective measures led to obvious differences and improvement in performance. Also they observed discrepancies between physicians in the medical interview of donor selection. Regular meetings with physicians resulted in reducing these discrepancies(10)

Southern California Blood Service was facing blood shortage due to lack of blood donors "where it is easier to get people to donate money than to donate blood(11)"Florida Blood Service was seeking ways to cut costs, to satisfy requirements for quality and compliance, as well as non-profit budget restrictions. Key areas challenging the existing infrastructure were: the increased volume of documents, varied standard operating procedures , disparately trained staff, a potential increase in customer issues, and the need for precision incident and error tracking and record keeping (12).

Our study revealed improvement in the knowledge of blood bank workers concerning history taking , examination, disinfection, and storage and transport which were statistically significant (Table 1) this is in accordance of a study in which improvement of knowledge of professional health workers about blood banking by 90% (13). Another study on staff members practicing within blood banks of healthcare establishments and achieved also high level of improvement after intervention(14).

Chen et al., 2004 stressed on the importance of medical education to produce physicians who deliver high-quality health care and to achieve this goal, medical education encompasses a broad continuum of distinct and diverse educational processes from medical school to residency training to continuing medical education(15). Also Bloom, 2005 proved the effectiveness of medical education in changing physician clinical practices and improving patient health outcomes(16).

As shown in table (2) 2.6% of studied sample was deferred in pre intervention phase which raised to 15.8% in post intervention phase which was statistically significant , in a study conducted in Papua New Guinea by Talonu (1983) The rate of rejection was (4%) (17) while the deferral rate reported by (Lim et al.,1993) was (2.4 %) (18) and that reported by (Chaudhry et al., 1995) was 16.4% (19) , and that of (Ranveet et al., 2002) was (8%) (20)and lastly (Sundar et al., 2010) reported the overall deferral rate was 6% (21).

Deferring donors protects the donors from possible adverse reactions and avoid consequent negative impact on the donor motivation. Also it guarantee blood of good quality for reciepients(21) Sundar et al., 2010

Concerning the change in mean percentage score of history taking before and after intervention (table 3) it was observed that

there was significance satisfactory improvement in history taking score to reach 65% after intervention.

Although the change in the percentage score of blood donor examination before and after intervention was statistically significance yet it needs more effort to reach satisfactory level because it still below median value. (36%) this restricted improvement can be explained by the fact that hemoglobin testing was still not performed due to absence of its kits. Temperature was not measured also due to absence of thermometers. Measuring pulse and blood pressure were not performed in spite of sphygmomanometer availability but it was neglected by the blood bank workers due to work overload. Workers mainly depend on general appearance and examination of arm and forearm for venepuncture site.

Other studies were measuring hemoglobin, blood pressure ,and weight to show deferral pattern and (8) others used eligibility criteria based on height and weight for proper donor selection (22).

CONCLUSION AND RECOMMENDATIONS

We conclude that proper donor selection leads to increase in the number of donor deferral. Health education and dissemination of standards of performance improve the quality of care in blood bank. We recommend that further studies are needed for improving other aspects in blood bank in Zagazig University Hospitals as disinfection process during donation and proper transportation of blood bags to other clinical areas. Supply the bank with kits for measuring hemoglobin and thermometers to measure donor temperature. Strict supervision on blood bank workers, increase human resources to prevent overload and continuous training programs for blood bank workers are needed.

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توكيد جودة الأداء في بنك الدم في مستشفيات جامعة الزقازيق

توكيد الجودة يتعامل مع كل جزئية في نظام العمل لتأكيد أن الأداء في كل مرحلة يسير بالمواصفات المطلوبة و بالنسبة لمراكز نقل الدم يعني تواجد نظام فعال يضمن أمان كيس الدم والتعرف على أي عيوب في ذلك النظام وان يصحح. ويعتبر الاختيار الأمثل للمتبرعين واستخدام الفحوصات الحساسة والتطبيق الإجباري لنظام توكيد الجودة من الضروريات للحفاظ على سلامة إمداد الدم

الأهداف:

1-دراسة الخطوات المختلفة الخاصة بعمل بنك الدم بمستشفيات جامعة الزقازيق ومعرفة أوجه القصور فيها .

2-اختيار مشكلة بين المشاكل التي تواجه العمل بنك الدم ووضع خطة لحلها.

3- تقييم خطة التدخل في العملية التي تم اختيارها لإصلاحها.

طرق البحث:

دراسة تدخليه تمت على ثلاث مراحل في بنك الدم في مستشفيات جامعة الزقازيق

المرحلة الأولى دراسة مقطعية لمعرفة العيوب في بنك الدم.

المرحلة الثانية دراسة تدخليه لإصلاح أحد العيوب المختارة

المرحلة الثالثة تقييم التدخل

وقد تم استخدام معايير العمل الخاصة بمراكز نقل الدم التي أصدرتها منظمة الصحة العالمية سنة 2002 محل للتقييم والتدخل.وقد أجريت الدراسة في بنك الدم بمستشفيات جامعة الزقازيق في المرحلة الاولى على348 متبرع بالدم ، 232 كيس دم وعلى 57 متابعه لاكياس الدم اثناء نقلها أما في المرحلة الثالثة تمت على 354 متبرع بالدم باستخدام قوائم تسترشد بمعايير منظمة الصحة العالمية الخاصة ببنوك الدم.

نتائج الدراسة

- حالة التبريد كانت مرضية بنسبة 60%
- الإجراءات الخاصة بكيس الدم كانت مرضية بنسبة 100% .
- كان هناك خلل في نقل أكياس الدم من بنك الدم إلى الاقسام الاكلينيكية. بينما النقل إلى بنك الدم اخركانت نتائجه مرضية بنسبة 87.7%
- كان هناك خلل في إجراءات التطهير خلال عملية التبرع
- زادت نسبة رفض المتبرعين بالدم من 2.6% الى 15.8% بعد التدخل نتيجة تشخيص أسباب جديدة لرفض التبرع.
- تم تحسين معارف الفريق الطبي ببنك الدم بخصوص المعايير المتعلقة باختيارالمتبرع وكيفيةالتطهير اثناء التبرع وتخزين ونقل أكياس الدم من مكان الى اخر.

الخلاصه

نجحت الدراسة في تحسين العمل ببنك الدم في مرحلة اختيار المتبرع وذلك بتحسين نسبة المعرفة و الاداء قبل وبعد برنامج التدخل. كان من أهم اسباب وجود نقاط الضعف في أداء العاملين ببنك الدم في مرحلة قبول المتبرع هو عدم وجود ارشادات او قواعد لأختيار المتبرع وقلة المعرفه بهذه القواعد.

وقد اثبتت الدراسه أيضا وجود نقاط ايجابية في مرحلة التبريد والتعامل مع اكياس الدم كذلك نقل الاكياس من بنك الى اخر ولكن هناك نقطه سلبية كبرى تتمثل في عدم استخدام قواعد التطهير لمنع العدوى خلال عملية التبرع.

التوصيات

ونحن نوصي بأن هناك حاجة إلى مزيد من الدراسات لتحسين الجوانب الأخرى في بنك الدم في مستشفيات جامعة الزقازيق كعملية التطهير خلال التبرع والنقل السليم لأكياس الدم من مكان الى اخر. يحتاج بنك الدم لمواد تحليلية لقياس الهيموجلوبين وموازين الحرارة لقياس درجة الحرارة للمتبرع.أيضا بنك الدم في حاجة الى رقابة صارمة على العاملين فيه، وزيادة الموارد البشرية لمواجهة ضغوط العمل وهناك حاجة لبرامج تدريب مستمرة للعاملين في بنك الدم.