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RATE OF REJECTION OF HAEMATOLOGY SAMPLES IN PATHOLOGY DEPARTMENT IN PORT MORESBY GENERAL HOSPITAL: A RETROSPECTIVE STUDY

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ABSTRACT:

The objectives of this study were to determine the rate of rejection of blood samples sent to the haematology section in the Pathology laboratory and to identify the areas of sample collection and the reasons for rejection. This retrospective study was conducted at the Port Moresby General Hospital within the period April 2012 to March 2013. The data was retrieved from the sample registration records in the haematology section. The percent cumulative rate of sample rejection over the 12 months duration of the study was 1.44%. The areas with the highest rate of rejected samples were those from the accident and emergency ward (23.19%) followed by children's ward (22.39%). Some of the causes for rejection were clotting of blood samples (19.24%) followed by requisition forms without samples (18.32%) and unlabelled samples (15.65%). Thus, technical errors in the pre-analytical phase of the laboratory testing were among the common reasons for rejection. This include insufficient blood collection, not inverting the sample bottle straight after collecting the blood for effective mixing with the anti-coagulant to prevent clotting, incorrect labelling of samples and request forms, and sending samples unaccompanied by request forms. The pre-analytical phase is vital in ensuring sample integrity and correct patient identification.

Keywords: Haematology, Anticoagulant, Blood sample, Rejection

INTRODUCTION:

Port Moresby General Hospital (PMGH) is owned by the state and is located at 3 mile in the National Capital District (NCD). It is the main referral hospital in Papua New Guinea (PNG). The facilities include, Outpatient (general enquires, accidents and emergency department, adult outpatient clinics, children outpatient); Children's ward (Wards 2A-Cardiac, 2B-Resperitory track, 2C-Diarrhoea, 2D-Tuberculosis and Special Care Nursery); Gynaecology wards (Ward 9, Ward 10, Anti-natal clinic and Labour ward); Medical wards (4A, 4B, 4C, and 4D); Surgical wards (3A, 3B, 3C); Intermediate ward; Special wards (intensive care unit); Consultation clinic and Dental clinic. Specialities include Heart Foundation units, Pathology laboratory, X-Ray department and Pharmacy department.

Haematology laboratory is one of the Pathology laboratory sections of the PMGH. It receives specimen and samples every day from outpatient draw stations, inpatient wards, and drop offs from patients and doctor offices. It serves the public and private hospitals as well as clinics in NCD and the whole country.

The common haematology requests received include, full blood count and blood coagulation profile that require blood to be added into specific volume of anticoagulant to maintain the un-clotted blood [1]. The haematology results generated from samples that are submitted are only reliable if the required amount of blood samples are collected in the appropriate containers labelled appropriately and transported immediately to the haematology laboratory [1]. It is sometimes difficult to reject a blood sample, especially from neonates; however, accurate results cannot be obtained from poorly collected blood samples. Therefore laboratories establish rejection criteria and policies that must be appropriately implemented to ensure high quality control and quality assurance [2 - 4]. The haematology standard operating procedure (SOP) manual provides guidelines for the collection and handling of blood samples, but with no clear documented reasons for rejection.

The objectives of this study were to determine the rate of rejection of blood samples sent to the haematology section in the Pathology laboratory and to identify the areas of sample collection and the reasons for rejection.

METHODOLOGY:

This was a retrospective study carried out to investigate the rate of haematology specimen rejection in Pathology department at the PMGH during the period April 2012 to March 2013. The data were retrieved from the laboratory records of samples for routine haematology testing. The data was appropriately sorted and all required information including monthly

rejections, rejection sites, and reasons for rejection were obtained and tabulated for analyses.

The study proposal was granted ethical clearance by the School of Medicine and Heath Sciences Research and Ethics Committee. Additional ethical clearance and permission were obtained from the Medical Service Officer at the PMGH and the National Department of Health Papua New Guinea.

RESULTS:

A total of 75,353 blood samples were received for haematology analysis from April 2012 to March 2013. It was noted that 74,267 were analysed and of these 1086 samples were rejected giving the rejection rate of 1.44% (1086/75,353) as shown in Table 1. As shown in the Table the highest rejection rate (2.065) was in March 2013 and the lowest (.076%) was in April 2012.

Rejected Samples and sites of collection:

The highest number, 80.20% (871/1086) of rejected samples were from the various wards and clinics in PMGH. This was followed by 8.93% (97/1086) from other health centres and clinics (Gerehu, Laloki, 6-mile, Gordon, Tokarara, Taurama, and University of Papua New Guinea) within NCD. The rate of rejected samples from other hospital and clinics is shown in Table 2.

In the PMGH, the rate of rejected haematology samples varies at the different wards and clinics. The highest rate of rejection site was from the accidents and emergency ward with 23.19% (202/871), followed by children's ward-(2A, 2B, 2C, 2D, 2E,) including children's outpatient with 22.39% (195/871). Rejections from all the other wards were less than 10% as shown in Table 3.

Reasons for specimen rejection:

Reasons for specimen rejection indicated that the clotted samples for full blood examination were the most common with 19.24% (209/1086). Other causes of rejection observed were requisition forms without samples, 18.3% (199/1086), 15.65% (170/1086) unlabelled samples, 13.90% (151/1086) without laboratory request forms, 12.89% (140/1086) with incorrect tube/incorrect cap and the other reasons are shown in Table 4.

The rate of rejection in the children wards was mainly specimen insufficient with 14.87% (29/195), followed by clotted specimen and wrong tube with 11.79% (23/195) each. While in the accident and emergency rate of rejection was due to no requisition form 17.82% (36/202), followed by forms without sample and unlabelled, 16.34% (33/202) respectively and clotted sample, 11.4% (23/202).

Table 1: Monthly distribution of total number of blood samples received, analysed, and rejected over the 12 months duration of the study.

Year	Month	Total Receive	Total Analysed	Total Rejects	Rejection Rate (%)
2012	April	6,026	5,980	46	0.76
2012	May	6,890	6,797	93	1.35
2012	June	6,196	6,090	106	1.71
2012	July	6,902	6,804	98	1.42
2012	August	6,981	6,885	96	1.38
2012	September	6,171	6,101	70	1.13
2012	October	7,232	7,165	67	0.93
2012	November	6,173	6,085	88	1.43
2012	December	4,155	4,073	82	1.97
2013	January	5,000	4,915	85	1.7
2013	February	6,362	6,257	105	1.65
2013	March	7,264	7,115	150	2.06
TOTAL		75,353	74,267	1,086	1.44

Table 2: Number (%) of rejected samples and sites of collection during the 12 months duration of the study

Hospitals and Clinics	Number (%) of rejected samples
Port Moresby General Hospital (all wards/outpatient and consultation offices)	871 (80.2%)
Other health centres and clinics within National Capital District	97 (8.9%)
Not specified	80 (7.4%)
Private Hospitals and private clinics	37 (3.4%)
Outside provinces	1 (0.1%)
Total	1086 (100%)

Table 3: Distribution (%) of rejected samples from the Wards and clinics in PMGH

Wards and clinic in PMGH	Number (%)
Accident and Emergency	202 (23.19%
Children's Ward (2A, 2B, 2C, 2D, 2E, COPD)	195 (22.39%)
Medical Ward (4A, 4B, 4C, 4D)	81 (9.3%)
Surgical Ward (3A, 3B, 3C)	78 (8.96%)
Special Care Nursery	74 (8.50%)
Antenatal Clinic (10)	48 (5.51%)
Heduru clinic (Sexually transmitted disease)	48 (5.51%)
Gynaecology (Ward 9)	43 (4.94%)
Labour Ward	23 (2.64%)
Consultation Clinic	17 (1.95%)
Ward 8	14 (1.61%)
Intensive care unit	14 (1.61%)
Ward 7	11 (1.26%)
Psychiatry (Ward 6)	7 (0.80%)
Pathology	6 (0.69%)
Eye clinic	4 (0.46%)
Diabetes clinic	3 (0.34%)
Skin Clinic	2 (0.23%)
Dental Clinic	1 (0.11%)
TOTAL	871 (100%)

DISCUSSION:

Identifying the technical errors and rate of rejection is important in the quality of laboratory results. We conducted a retrospective study to identify the proportions of rejected specimens at the haematology laboratory. We detected an overall specimen rejection rate of 1.44%. The specimen rejection rates differ from developing [6 – 10] and developed countries [7 – 11]. In this retrospective study the rejection rate were similar to that reported in India 1.99% [6] and in Turkey 0.56% [7]. The highest prevalence of rejected specimen 2.1% (150/7264) was in March 2013, the lowest prevalence, 0.76% (46/6026), was in April 2012. Table 4 shows the data obtained for all the other months.

The causes for rejection were due to clotting of specimens (19.24%) followed by requisition forms without samples (18.32%) and unlabelled samples (15.65%).The clotted samples, is

probably due to poor gentle mixing after blood collection and leaving the tubes horizontally instead of keeping them vertical [7].

Parenmark and Landberg [10], reported that mixing blood samples after collection is important but may produce haemolysis. In this study haemolysis number was very low (0.18%) in contrast to other studies elsewhere. Laboratory request forms without blood specimen are the second most common reason (18.32%) for sample rejection, which is due mainly to preanalytical errors. Goswami et al., [6] clearly identified that wrong patient identification should be targeted throughout the hospital that can lead to unsuitable specimens eventually rejected when received in the medical laboratory.

It was observed that unlabelled samples (15.56%), no laboratory request form (13.90%), wrong tube/wrong cap (12.89%), insufficient sample (9.30%), name/details not correspond (5.89%), wrong request form (0.28%) are mostly due to carelessness or to get the job done hurriedly [6]. It is not surprising to see insufficient blood collected from children and neonates who may be frightened during the phlebotomy procedures. Furthermore collection of blood from children and neonates is difficult and requires a specialist phlebotomist and not a ward staff. Hence ward staff should be trained to collect blood samples for haematology and biochemistry [7].

The rejection rate was higher at the accident and emergency followed by children's ward but less in the clinic at the PMGH. The highest rate of rejected samples was in the accident and emergency ward (23.19%) followed by children's ward (22.39%). This proves that proper training, guidance and supervised collection can help to attain efficacy as well as minimize these preventable errors which are beneficial to patients and physicians [6, 8].

One of the limitations of our study was that we could only give the results of the wards but not the different sections of those wards at the PMGH.

CONCLUSION:

Blood sample rejection in haematology prevents sample analysis and leads to new sample request, which delay in patient's diagnosis and treatment [9]. The total rate of rejected blood samples in haematology section at the Pathology laboratory in PMGH during the period of this study was 1.44%. In PMGH the rejection rate was higher in accident and emergency ward (23.19%) and children's wards including the children's outpatient (22.39%). The main reasons for the specimen's rejection were the unwanted clotting (19.24%) and followed by requisition forms without sample (18.32%). For these reasons there is a

need to improve blood collection techniques, handling and transportation on haematology blood samples so that required tests are performed appropriately and accurate results generated [2]. Further studies should be done to enhance documentation, include policy on sample rejection in the SOP manual and periodic training for healthcare personnel working in the wards and clinics with high rates of rejection.

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