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ORIGINAL RESEARCH

Awareness and application of various CBC parameters among clinician: A cross sectional survey at a tertiary care hospital

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Abstract
Aim: Trends in the use of Complete Blood Count parameters for patient treatment by clinicians in various tertiary care hospitals.
Material and methods: A questionnaire that participants filled out on their own as part of a cross-sectional research was used. Through the use of convenience sampling, Physicians working at a tertiary care hospital were included. The questionnaire was given out to medical professionals working in surgical, paediatric, obstetrics/gynecology, and outpatient clinics during normal business hours, and it was collected on the same day. Before the questionnaire was sent out to the participants, we made sure to get their informed permission beforehand.
Results: Only three of the eleven characteristics were selected by over 75 percent of the doctors as being often or always beneficial. Hemoglobin, platelet count, and white blood cell count were the three metrics in question. The other eight parameters of the CBC were deemed less than 75% helpful by the attending doctors. The usage of mean cell volume (MCV) was found to be more prevalent among interns and house officers than it was among other types of doctors. More than 57% of general practitioners and interns regarded reticulocyte count as always beneficial or often useful in their everyday practices, whereas other doctors utilized it less than 42% of the time. Twenty-five percent of the doctors who responded to the survey recommended that the laboratory result be verified by peripheral film, and final reporting should be done by a haematologist.
Conclusion: According to the findings of this research, the vast majority of medical practitioners only make use of three of the most fundamental criteria seen on a full blood count. In order to expand the doctors' understanding of the usefulness of additional indicators, it is possible to design an educational intervention for awareness regarding various blood count parameters and their utility in patient care among medical practitioners.
Keywords: Complete Blood Count, clinicians, RBC, platelets and WBC

Introduction

The clinical information that may be gathered from laboratory testing is very helpful in making diagnoses and making decisions about patient care.[1] A number of studies have shown that despite the fact that physicians frequently request laboratory tests, they have a tendency to ignore or misinterpret the results. This improper utilization and interpretation obviously has implications for the quality of patient care as well as the economy as a whole. [2] A complete blood count, often known as a CBC, provides information about the cells that are

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found in human blood, including white blood cells, platelets, and red blood cells. [3] In addition to this, it provides the concentrations of numerous cellular components as well as their relative proportions. It is also known as a complete blood exam or full blood count (abbreviated as FBC) (FBE). It provides the clinician information pertaining to Hemoglobin (Hb)and other indices about red blood cells such as Red Blood Cell count (RBC), Mean Cell Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC), Red cell Distribution Width (RDW), and parameters about white blood cells such as total White Blood Cell Count (WBC) and differential count of neutrophils, basophils, eosinophils, monocytes, [4] A complete blood count (CBC) is a crucial haematological test that is included in the clinical decision-making process and is frequently requested by doctors. Its purpose is to identify the numerous conditions that may lead to anaemia, including infection, a variety of haematological tumours, states of low or high platelet count, and responses to various treatments. [5] When reviewing a CBC report, the majority of doctors look at just the four most fundamental indicators, such as Hb, hematocrit, WBC count, and platelet count, according to the findings of a number of studies.[6,7] Due to the fact that it is the test that is requested the most often, it is very necessary to have an in-depth knowledge of its parameters, the relevance of the differential count, and the frequency with which it needs to be requested.

[8]With the introduction of automated hematological analyzers,the clinicians now have access to a large number of reports that provide extensive data about cell type and indices. Platelet indicators such of platelet volume, plateletcrit, and platelet distribution width, among others, have been identified as potential new markers for diagnosis and prognosis in more recent research. [9] The emerging importance of reticulocytes in the diagnosis of anaemia, such as reticulocyte haemoglobin content or reticulocyte mean volume, could indicate that doctors will have more information to analyze in the future. [10,11] Therefore, it is proposed that the information included in the complete blood count is valuable for clinicians in the care of patients; yet, it is possible that they are not making appropriate use of this information. [12]

Material and methods

A questionnaire that participants filled out on their own as part of a cross-sectional research was used. This questionnaire was developed with the assistance of the data acquired from the research conducted in the United States by Sandhu and colleagues[6]. Two experts participated in the validation of the questionnaire. Through the use of convenience sampling, various physician working at a tertiary care hospital were included. The researchers decided not to include nurses and other paramedical professionals in their study. The questionnaire was given out to medical professionals working in surgical, pediatric, obstetrics/gynecology, and outpatient clinics during normal business hours, and it was collected on the same day. Before the questionnaire was sent out to the participants, we made sure to get their informed permission beforehand. Statistical analysis, carried out using SPSS version 25.0 software, was performed on the data.

Results

The poll asked a total of 118 doctors from a tertiary care hospital located at northern India about the frequency with which they utilize CBC and reticulocyte report results. The number of doctors that responded were 100 (84.7%). The majority of the responders were general practitioners and specialists who had less than five years of clinical experience (Table 1).

Table 2 displays the clinicians' personal assessments of how useful the CBC parameters are in their practice. Only three of the eleven characteristics were selected by over 75 percent of the doctors as being often or always beneficial. Hemoglobin, platelet count, and white blood

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cell count were the three metrics in question. As can be seen in Table 2, the other eight parameters of the CBC were deemed less than 75% helpful by the attending doctors.

The usage of mean cell volume (MCV) was found to be more prevalent among interns and house officers than it was among other types of doctors. This measure was used for the treatment of patients by 65% of the interns and 52% of the house officers, while other doctors utilized this parameter for patient management only seldom. In general, the interns placed a higher importance on the various aspects of the CBC report than did the other doctors. The red cell distribution width (RDW) was used seldom by all of the physician groups, and an average of 20% of the replies said that it was helpful. There was a significant divide in opinion among the interns and other doctors over the value of the red blood cell count. As indicated in Table-2, 85 percent of the interns thought it was beneficial either always or often, but just 52 percent of the general practitioners thought it was useful all the time. More than 57% of general practitioners and interns regarded reticulocyte count as always beneficial or often useful in their everyday practices, whereas other doctors utilized it less than 42% of the time.

Table-4 displays feedback on the quantity of data, preferred manner of reporting WBC, necessary laboratory training for providing a CBC report, and chosen units for cell count. It was discovered that differentials expressed as percentages were more helpful in the clinical setting than absolute differentials.

The preferences of physicians on the reporting of cell count findings are outlined in Table-3 below. The vast majority of the doctors favoured having the findings given as cell count per microliter. We asked the doctors in the poll what they thought about the quantity of information that was included in the CBC story. The majority of respondents, over 82% of doctors, agreed that the data was accurate. The vast majority of responders were of the opinion that the CBC report should not undergo any revisions.

According to the results of our survey, fifty percent of respondents did not want any changes made to the way the reports are organized, while twenty percent advised that the laboratory report be made available through computer (Table-4). Twenty-five percent of the doctors who responded to the survey recommended that the laboratory result be verified by peripheral film, and final reporting should be done by a haematologist.

Table 1 Distribution of study participants

Category of participants	Frequency	Percentage
Profession	100	
*HO	25	25
GP	30	30
Specialist	30	30
Intern	5	5
Resident	10	10
Years of experience		
<5 yrs	60	60
6-10 yrs	15	15
> 10 yrs	25	25
Specialty =	**30**	
Internal Medicine	9	30
Gyn-Obs	7	23.33
Surgery	3	10
Pediatrics	6	20
Others*	5	16.67

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Table 2: Rate of use of CBC parameters by profession.

Profession	WBC count		RBC count		HB		HCT		MCV		MCHC		MCH		RDW		Platelet count		MPV		Retic count	
	F/A	R/N	F/A	R/N	F/A	R/N	F/A	R/N	F/A	R/N	F/A	R/N	F/A	R/N	F/A	R/N	F/A	R/N	F/A	R/N	F/A	R/N
GP	75	25	52	48	74	26	36	64	40	60	30	70	20	80	18	82	76	24	20	80	57	43
HO	74	26	62	38	75	25	62	38	52	48	15	85	22	78	20	80	75	25	22	78	30	70
Intern	76	24	85	15	73	27	65	35	65	35	20	80	74	26	25	75	78	22	30	70	62	38
Resident	75	25	60	40	73	27	45	55	58	42	44	56	40	60	22	78	76	24	20	80	36	64
Specialist	76	24	55	45	72	28	42	58	45	55	35	65	45	55	24	76	75	25	24	76	42	58

Table-3: Feedback of physicians regarding CBC report (reported in percentages

	Amount of Data			Preferred method of WBC count reporting		Laboratory Training		Preferred Units for cell count	
	Too Little	Too Much	Just Right	Percentage	Absolute	Adequate	Non-Adequate	/µL	/cm3
GP	1	20	79	56	44	60	40	35	65
HO	10	15	75	57	43	42	58	85	15
Intern	0	10	90	26	74	77	23	60	40
Resident	7	8	85	40	60	45	55	80	20
Specialist	6	14	80	60	40	50	50	62	38

Table-4 Suggestions for improvement in CBC reporting (reported in percentages).

	Suggestions			
	Computerized report	Peripheral film included	Signed off by hematologist	No change
GP	20	12	18	50
HO	15	10	20	55
Intern	30	35	0	35
Resident	20	10	10	60
Specialist	25	15	5	55

Discussion

As a result of this study, several patterns of usage of CBC parameters such as differential counts and reticulocytes count, cell count units, and report design recommendation were discovered. The response rates of 84.7% of doctors, including general practitioners, house officers, interns, residents, and consultant / specialty physicians, well met our expectations. The participation of a variety of various categories of doctors in the research provides a more comprehensive understanding of CBC reporting and the value it carries. According to the findings of this research, using the results of a complete blood count parameters and reticulocyte count for decision-making in patient care in hospitals is insufficient and underutilized.

According to the findings of the research, the counts of white blood cells, haemoglobin, and platelets were the ones that were utilised the most often or always by the majority of doctors.

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In the everyday practices of the doctors, these three factors were picked and utilized more than 75% of the time, however the research carried out by Sandhau's in the United States revealed that these parameters were used more than 90% of the time by the physicians. [6] RBC count was not used for the care of patients by almost more than half of the doctors, which is consistent with the findings of another research that showed RBC count is not often used in decision making. [7]

In the research, MCV, MCH, and MCHC were considered to have a poor usefulness, similar to what was found in earlier studies carried out in different locations.

The MCV has long been recognised as the RBC characteristic that contributes the most to the accurate diagnosis of anaemia.[5,7,13]

In clinical practise, MCH and MCHC values are often utilised by physicians for long term follow up, although they are not necessary for acute diagnosis. This is because MCH and MCHC values provide information on chronic disease.[14] According to the findings of our research, RDW is used a great deal less often or always than the various other red cell indices. According to the findings of another research, over 67% of the doctors either did not use RDW at all or used it very little. [14] On the other hand, it has been observed that RDW is a very under-utilized metric. [15] According to the results of our poll, doctors see less value in using Mean Platelet Volume. Despite the fact that recent studies[15-18] seem to indicate that there are therapeutic advantages to platelet characteristics, the contribution of MPV to clinical practise was rather small. [19]

When it came to reporting white blood cell count, the majority of the doctors felt more at ease using differentials as opposed to absolute counts. One may make the case that since this is the standard practice, medical professionals have a better grasp of the differential. This would be preferable to the alternative of knowing the reference ranges for absolute cell counts and translating them into percentages so that they can be understood.

In reference to the several types of units used to assess cell counts, such as RBC, platelets, and WBC. It is possible to provide these data in either cubic millimetres or per microliter. According to our research, the vast majority of doctors would rather have the cell count stated per microliter, but a study carried out in the United States found that the vast majority of doctors there would rather have it reported per cubic millimetre. [6]

Our investigation indicated that the reticulocytes count was used seldom, which was consistent with the findings of another hospital's study, which also found that the reticulocytes count was used infrequently.[12] 45 percent of those who took part in our survey have expressed the opinion that the quantity of information provided in the CBC report is sufficient. In the course of our research, we found that the response rate of the doctors about the modification of the laboratory report design was nil. Twenty percent of the medical professionals surveyed suggested that the laboratory report should be done using a computer, while twenty-five percent of the medical professionals surveyed suggested that the laboratory report should be verified by peripheral film and that the reports should be done by a haematologist. A study that was conducted in Canada found that doctors had a poor opinion of the usefulness of morphology reporting in CBC. The researchers recommended leaving out morphological details that are not applicable to clinical practice. [20]

Conclusion

According to the findings of this research, the vast majority of medical practitioners only make use of three of the most fundamental criteria seen on a full blood count. In order to expand the doctors' understanding of the usefulness of additional indicators, it is possible to design an educational intervention for them. The characteristics of a complete blood count are significant haematological tests that are used frequently in clinical decision making, particularly in the treatment of anaemia and other blood diseases. The use of CBC parameters

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in the practices of the doctors who were questioned for this research was determined to be unsatisfactory. Researchers in this study concludes that the Complete blood count remains to be frequently requested yet underutilized investigation. Each parameter holds its significance as an important clue towards diagnosis.A thorough knowledge about the significance of various parameters of CBC will help in diagnosis and follow up as well as a screening tool for various medical conditions . We recommend that various awareness and educational sessions should be conducted periodically among medical professionals to update them about the utilization of CBC.

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