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Discrepancies in ABO and Rh Grouping in Southeast Iran, an Analysis of 3 Years' Experience

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Abstract

Background: ABO and Rh blood grouping discrepancies are significant causes of transfusion-related morbidity and mortality. Most of these errors occur when blood grouping standards are unavailable or misinterpreted. This study determined the rate of such errors among hospitals in Zahedan, a city in southeast Iran. We also assessed the prevalence of ABO and Rh grouping errors in the Iranian Blood Transfusion Organization (IBTO) in Zahedan.

Method: During the study, 30,254 blood bags were sent to five of Zahedan's hospitals. Pre-transfusion ABO and Rh blood grouping was carried out by slide method. Any sample showing a discrepancy between IBTO and hospital laboratory was returned to IBTO for identification of the error by the American Association of Blood Banking (AABB) standards protocol.

Results: We observed 420 discrepancies in the pre-transfusion ABO and Rh blood grouping of 30,254 units, a 1.4 percent error, among Zahedan hospitals. The most common error was misidentification of group A as O (62 cases), while group B was misidentified as O in 41 cases. We discovered critical errors, such as misdiagnosis of A as B and vice versa, which could endanger the patient's life. We also noted 20 misidentifications in routine IBTO laboratory testing, a 0.02 percent error.

Conclusion: The high incidence of pre-transfusion blood grouping errors emphasizes the necessity of always using standard forward and reverse grouping tests in hospitals.

Keywords: ABO; Rh; Blood grouping; Discrepancy

Introduction

ABO and Rh blood group discrepancies account for a considerable number of reported transfusion-associated reactions [1,2]. But the focus now is almost entirely on the risk of transfusion-transmitted infections. Grouping errors can result in significant, even fatal, outcomes. Fortunately, most of these errors do not lead to a clinically adverse outcome. Human errors are a significant contribution to blood grouping discrepancies but some errors are not inevitable [1-3].

The transfusion laboratory is unique among diagnostic laboratories because its life-saving blood products may, at the same time, be life-threatening agents. Since blood transfusion is a long and complicated process involving many steps and individuals, there is potential for a high rate of error. ABO and Rh discrepancy can thus occur [1,2,4,5]. These errors have been reported to range from 1 in 3,400 cases to 1 in 517 samples.

Different agents such as miscollection of blood, errors in documentation and registration of patients and donors are responsible [2,6,7]. Mindful of these errors, we set up an investigation to determine the rate of ABO and Rh grouping discrepancies among hospitals of Zahedan, a city in the southeast of Iran.

Materials and Methods

This prospective study was carried out on 30,254 donor blood samples in Zahedan's regional blood transfusion center over a period of three years from July 2000 to August 2003. In this period, units of blood sent, on request, to five of Zahedan's hospitals were examined. In hospital blood banks, all samples were rechecked for ABO and Rh blood groups by slide method. For this purpose, 5-10 cm segments of tubes were taken from the bags via tube sealers. One drop of corresponding anti sera (human polyclonal anti sera prepared by the IBTO) and one drop of whole blood were mixed in; the reaction was interpreted as agglutination. Units without ABO and Rh discrepancy were sent for blood transfusion while any discrepancy resulted in return of the bag to the immunohaematology reference laboratory for further investigation. Initially all samples were rechecked by forward and reverse blood grouping. In the presence of any discrepancy, further investigation, using a protocol as outlined by the AABB manual, was undertaken. Finally obtained results were recorded and the confirmed blood group was reported to each hospital blood bank.

Results

Incidence of ABO and Rh blood group discrepancy

Out of 30,254 blood donors, 420 cases with ABO and Rh blood group discrepancies (1.4%) were detected. Most were ABO blood

group discrepancy (n: 277 cases, 66%), while Rh comprised 34 percent of total discrepancies (143 cases). Table 1 summarizes the results of ABO discrepancies.

We also had 4 cases with simultaneous ABO and Rh errors, summarized in Table 2.

Rapid Blood grouping	Forward and reverse	Confirmed diagnosis	Number	Relative percent
A	O	O	19	6.9
B	O	O	22	8
AB	O	O	5	2
A	AB	AB	28	10.1
B	AB	AB	38	13.7
O	AB	AB	4	1.4
B	A	A	18	6.5
AB	A	A	22	7.9
O	A	A	62	22.4
A	B	B	11	4
AB	B	B	7	2.5
O	B	B	41	14.8
			277	100

Table 1: 277 ABO grouping errors that were observed among five hospitals in Zahedan city.

Case	Rapid test	Forward & Reverse typing	Confirmed test
1	AB+	A-	A-
2	O+	B-	B-
3	O-	A+	A+
4	AB+	B-	B-

Table 2: Four cases with simultaneous errors of ABO and Rh blood groups.

The most common ABO errors were observed in group A blood that was diagnosed as O (62 cases); B was diagnosed as O in 41 cases. Other common errors in rapid slide blood grouping concerned the AB group.

In 38 cases it was diagnosed as B, in 28 cases as A and in 4 cases as group O. All above errors were due to the use of rapid slide blood grouping. However, we also identified 20 errors made by the IBTO, detected during rapid procedure in hospital pre-transfusion tests.

11 out of 20 were ABO grouping errors and 9 were Rh grouping errors. Among IBTO's grouping errors, the most common was the misidentification of ABO as B. Table 3 summarizes these 11 errors.

Rapid Blood grouping	Forward and reverse	Confirmed diagnosis	Number	Relative percent
AB	B	AB	4	36.3
O	A	O	3	27.3
O	A	O	3	27.3
AB	A	B	1	9.1
			11	100

Table 3: Eleven ABO blood grouping errors of IBTO of Zahedan city.

Out of 30,254 instances of blood grouping carried out in the IBTO, 20 errors comprised a 0.02% error rate. Compared with rapid procedure (1.4%) this was statistically significant (<0.001).

Discussion and Conclusion

Discrepancies in blood grouping are the major causes of transfusion reactions. A proper strategy for avoidance of these errors seems critical [1,3]. ABO and Rh grouping are the most important pre-transfusion tests [2,5,8]. Thus this study investigated the prevalence of grouping discrepancies among a number of hospitals and the IBTO, all in Zahedan. All hospitals carried out pre-transfusion ABO and Rh grouping by the rapid slide method: we found 1.4 percent of errors in blood grouping by this method. This is a relatively high error rate in a critical situation. If the errors were ignored, they could endanger a patient's life. Some of the misdiagnoses, such as identifying A as B blood group or vice versa, are really critical and dangerous. One important finding was that approximately 39 percent of total errors of the slide method were misdiagnosing blood as group O. This error can occur if, before reading the result, sufficient time is not given for hemagglutination. Another cause for this error is that minor blood groups were not considered as having a weakly positive hemagglutination reaction.

On the other hand, we also detected a 0.02 percent error in IBTO's standard blood grouping. This finding appears minor, but it alarms hospital laboratories as to their absolute confidence in the organization since errors may lead to dangerous results [9-11] such as immediate transfusion reactions.

That some errors creep into routine laboratory work seems inevitable [4,5]. Clerical errors, technical errors, technician observation errors or mistakes in recording the results of standard ABO and Rh grouping in regional transfusion organizations can, and do, occur; the possibility of technical or clerical errors cannot be discounted. Thus the necessity for confirmatory grouping tests in hospital before any transfusion. And as rapid blood grouping has a high rate of error and inaccuracy, pre-transfusion grouping by standard procedure can further limit error and the possibility of a transfusion reaction.

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