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Analysis of Turn Around Time of Arterial Blood Gas Samples in a tertiary care hospital

KEYWORDS: Turn around time , Analytic phase, Arterial Blood G

Dr.K.Indhu

Assistant professor, Department of Biochemistry, Government medical college & ESI Hospital, Singanallur, Coimbatore- 15.

Dr.T.Saravanan

Professor, Department of Biochemistry, Government medical college & ESI Hospital, Singanallur, Coimbatore- 15.

ABSTRACT Arterial blood gas analysis contributes to the assessment of patient`s ventilation status and acid base balance. Delay in results of arterial blood gas samples will affect the patient care. So it is appropriate to do a study on Turn Around Time (TAT) of arterial blood gas analysis. Turn around time (TAT) includes time of specimen collection, receiving time in the laboratory and reporting time of test results. The laboratory TAT is separated into three phases: pre-analytic, analytic, and post-analytic. The analytic phase is the time required to produce a verified result and is typically used as a measure of laboratory quality. Out of the 305 samples analysed, Analytical TAT distribution mostly confines to 2 to 12minutes.Reporting TAT distribution mostly confines to 2 to 8 minutes. As a whole, Laboratory TAT is delayed in 15 cases (5%). The main contributor is analytical TAT. The main reason for delay in analysis is sample sent in batches from the intensive care units. Streamlining these processes will further reduce the turn around time of Arterial blood gas samples.

Introduction:

Arterial blood gas analysis contributes to the assessment of patient`s ventilation status and acid base balance[1]. Delay in results of arterial blood gas samples will affect the patient care[2]. The total TAT is separated into three phases: pre-analytic, analytic, and post-analytic[3]. The pre-analytic phase encompasses the time beginning from the moment an order is given for a test and lasts through the processing of that order, collection and transport of a specimen to the laboratory. The analytic phase is the time required to produce a verified result and is typically used as a measure of laboratory quality. The post-analytic phase is the time from completion of analysis to the reporting of a test result. Preanalytical TAT is maintained with the use of pneumatic tube systems for transport. Post analytical TAT is also maintained by issuing reports using laboratory information system (LIS)[4]. Analytical and post analytical phase together constitute the laboratory TAT. This study aims at analyzing the laboratory TAT.

Aim:

To analyze the Turn Around Time (TAT) of arterial blood gas samples in a tertiary care hospital and to evaluate the steps necessary to reduce the same.

Standards:

100% of the samples for arterial blood gas analysis should adhere to the defined Total TAT of lab (30 minutes)
Pre-analytical TAT: 10 minutes
Analytical TAT: 15 minutes
Post-analytical TAT: 5 minutes

Materials and method:

Institutional human ethics committee approval was obtained.

Sampling method:

Consecutive sampling
All the samples were analysed in fully automated analysers.
Sampling time, Sample receiving time, time of completion of analysis, reporting time were noted. Total samples analyzed were 305 over a period of 1 week.
Results were analysed using SPSS software version 17.

Results:

Total samples analyzed were 305.
31 samples did not have sampling time.
Four samples did not have the receiving time.
Sampling and receiving time did not match for nearly half of the samples (162 samples).

Seven samples have exceeded the analytical TAT limit of 15minutes.

86 samples exceeded reporting TAT of 5 minutes.

In total 5% of samples exceeded the laboratory TAT

Discussion :

Sampling and receiving time errors were more frequent in a day around 5 to 7.30 AM and 6.00 to 7.00 PM. Almost all samples are analysed within the allowable analytical TAT of 15minutes. The average analytical TAT is 5 minutes (Fig 1). Seven samples have exceeded the analytical TAT limit of 15minutes.Reason for delay in all these cases is rejection of samples and re-sampling. Out of 305 samples, 86 samples exceeded reporting TAT of 5minutes (Fig 2). The delay is prominent from 6.00am to 8.00am.

Out of 305 samples analyzed for Laboratory TAT, fifteen samples exceeded the laboratory TAT of 20minutes.In most of the cases analytical TAT contributed much for the delay in laboratory TAT (Fig 3). The main reason for delay in analysis is sample sent in batches from the intensive care units. 6.00am to 8.00am is the time of the day in which most delay in all forms of TAT happens (Fig 4). Duty-switch over among technicians is the main reason.

Conclusion:

Laboratory TAT is delayed in 15 cases (5%). The main contributor is analytical TAT.

6.00am to 8.00 AM is the time of the day in which most delay in all forms of TAT happens.

Duty-switch over and sending samples in batches are the main reasons. Analytical TAT may be reduced from 15 minutes to 10minutes and the reporting TAT may be revised from 5 minutes to 8minutes as noted from the TAT distribution (Fig 1,2). Following steps were evaluated to reduce the TAT. Time of ordering ABG may be integrated to LIS/HIS .Routine samples like patient on ventilator may be sent early in the morning (4.00 to 5.00am) to avoid overlap over the duty change over time. The intensive care unit staffs may send the sample as and when the sample is collected instead of piling and sending them in batch. Otherwise, the sample may be analyzed in the intensive care unit itself.

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Fig 1:Distribution of Analytical TAT

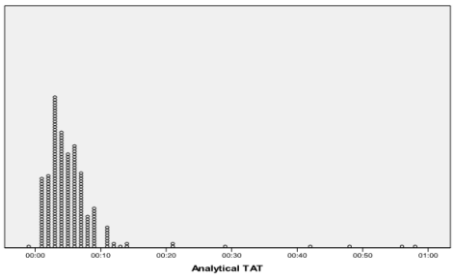


Fig 2:Distribution of Reporting TAT

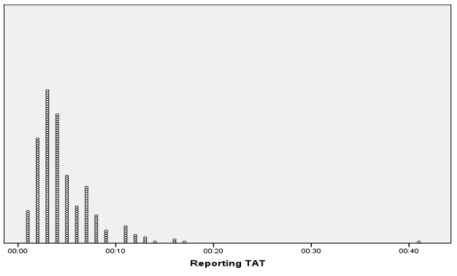


Fig 3 : Composition of Laboratory TAT

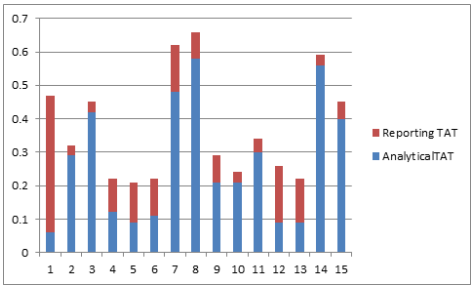
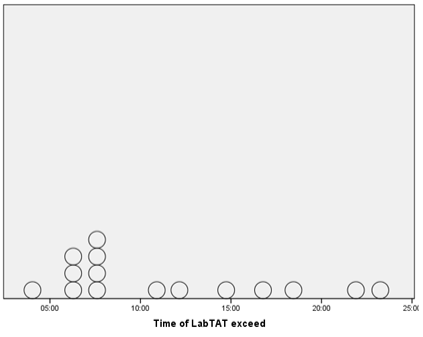


Fig 4: Distribution of TAT exceed over the time of the day



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