Analyzing a Rhythm Strip

Step #1: What is the Rate?

There are 4 methods for measuring the rate:

1. Six-Second Method

This is the simplest way of determining the heart rate, but the least accurate.

You can use this method when the rhythm is regular or irregular.

The paper is marked in 3 second increments.

To determine the ventricular rate, count the number of complete QRS complexes in a six second period and multiply by 10.

2. Large Boxes

To determine ventricular rate, count the number of large boxes between two consecutive R waves (R-R interval) and divide into 300.

To determine atrial rate, count the number of large boxes between two consecutive P waves (P-P interval) and divide into 300.

The large box method is best used if the rhythm is regular.

3. Small Boxes

Each 1 mm box on the graph paper represents 0.04 sec. There are 1500 boxes in 1 minute.

To calculate the ventricular rate, count the number of small boxes between two consecutive R waves and divide into 1500.

To determine atrial rate, count the number of small boxes between two consecutive P waves and divide into 1500.

Small box method is time-consuming, but accurate.

4. Sequence Method

To determine ventricular rate, select an R wave that falls on a dark vertical line.

Number the next 6 consecutive dark vertical lines:

300
150
100
75
60
50

Note where the next R wave falls in relation to the 6 dark vertical lines already marked. This is the heart rate.

So, we need to determine: what is the exact rate?

Is the atrial rate the same as the ventricular rate?

Step #2: Is it regular or irregular?

To determine if the ventricular rhythm is regular or irregular, measure the distance between two consecutive R-R intervals and compare that distance with the other R-R intervals.

If it is regular, the R-R intervals will measure the same.

Same thing for the atrial rhythm (measure P-P interval).

Use a piece of paper, index card, etc.

There are various terms that will be used to describe an irregular rhythm

If the variation between the shortest and longest R-R intervals (or P-P) is less than 0.16 sec, the rhythm is essentially regular.

If the shortest and longest R-R intervals vary by more than 0.16 sec, the rhythm is considered irregular.

A regularly irregular rhythm is one where:
- -R-R intervals are not the same
- -the shortest and longest R-R intervals vary by more than 0.16 sec
- -there is a repeating pattern of irregularity

An irregularly regular rhythm is one where:
- -R-R intervals are not the same
- -shortest and longest R-R intervals vary by more than 0.16 sec
- -no repeating pattern of irregularity

Is it regular?

Is it irregular?
- -regularly irregular?
- -irregularly irregular?

Are there any patterns to the irregularity?

Are there any ectopic beats?
- -are they early or late?

Step #3: P waves?

Are there P waves?

What is the atrial rate?

Normally, one P wave precedes each QRS complex, they occur regularly, and appear similar in size, shape, and position.

What does the P wave look like?

Do each of the P waves look like the others?

If no P wave is present, the rhythm originated in the AV junction or lower.

Is the P wave positive? If so, it originated from the SA node.

Is it negative or absent? If so, and the QRS complexes occur regularly, the rhythm probably occurred from the AV junction.

Are there P waves for every QRS?

Is the P wave in front of the QRS or behind it?

Is the P wave normal and upright in Lead II?

Are there more P waves than QRS complexes?

Do all P waves look alike?

Are the irregular P waves associated with ectopic beats?

Step # 4: PR Interval

Measure the PRI from the point where the P wave leaves the baseline to the beginning of the QRS complex.

Normal PRI is 0.12-0.20 sec (3-5 little boxes).

Is the PRI within normal range?

If the PR intervals are the same, they are said to be constant.

Are all the PRIs constant?

If the PR intervals are different, is there a pattern?

What is the AV conduction ratio?

This is the ratio of P waves to QRS.

If all P waves are followed by a QRS, the AV conduction ratio is 1:1.

If, for every two P waves one is followed by a QRS, the AV conduction ratio is 2:1.

Step #5: QRS Complexes

What is the duration?

Measure from the point where the first wave of the complex begins to deviate from the baseline to the point where the last wave levels out.

Normal QRS: less than 0.10 sec

Abnormal QRS: more than 0.10 sec/wide, bizarre looking

If all of the QRS complexes are equal and normal in duration and shape, they are most likely supraventricular in origin (in SA node, atria, or AV junction).

If not, origin may be ventricular or supraventricular with a bundle branch block.

Step #6: Overall Appearance of the Rhythm

ST segment is usually isoelectric.

Is there significant ST segment elevation or depression?

Evaluate the T waves.

Are they upright and of normal height?

Negative T waves indicate myocardial ischemia.

Tall, pointed, peaked T waves indicate hyperkalemia.

Step #7: Identify the Arrhythmia and Interpret the Rhythm

Interpret the rhythm, specifying the origin (pacemaker site) of the rhythm, the mechanism (bradycardia, tachycardia), and ventricular rate.

Then we must use the rhythm strip in conjunction with the evaluation of the patient's clinical presentation to determine how they are tolerating the rhythm and how we are going to treat them.