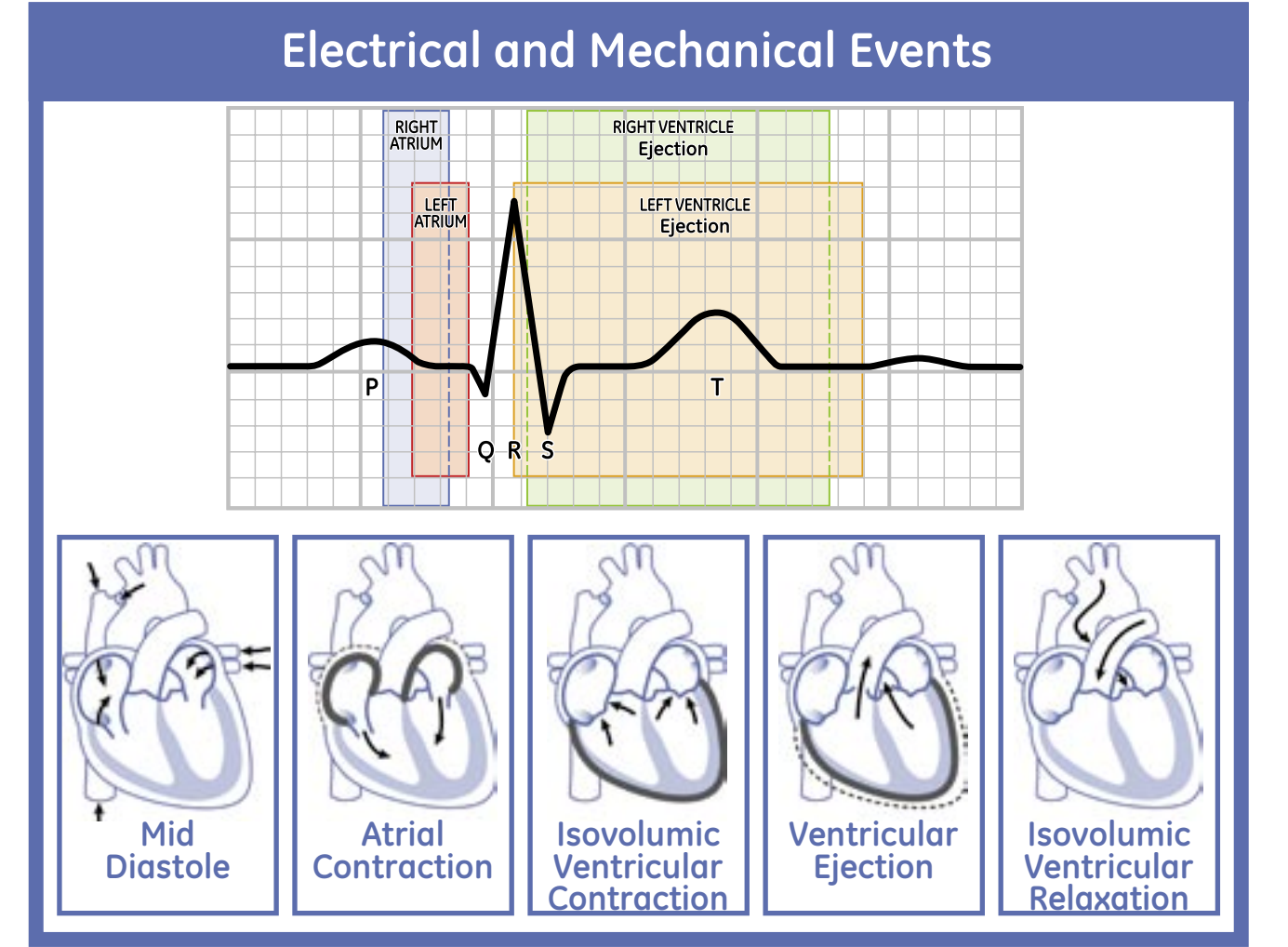
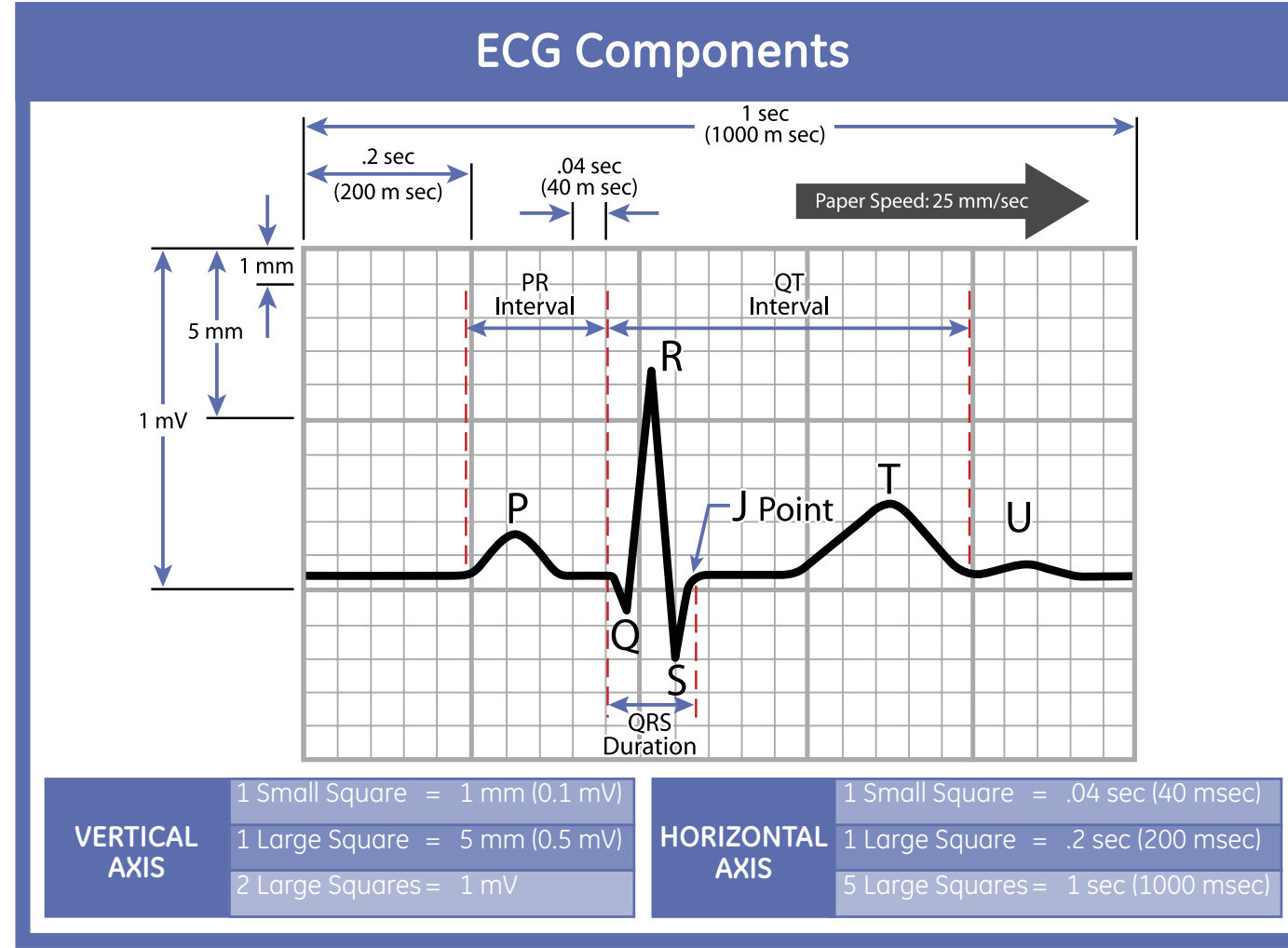
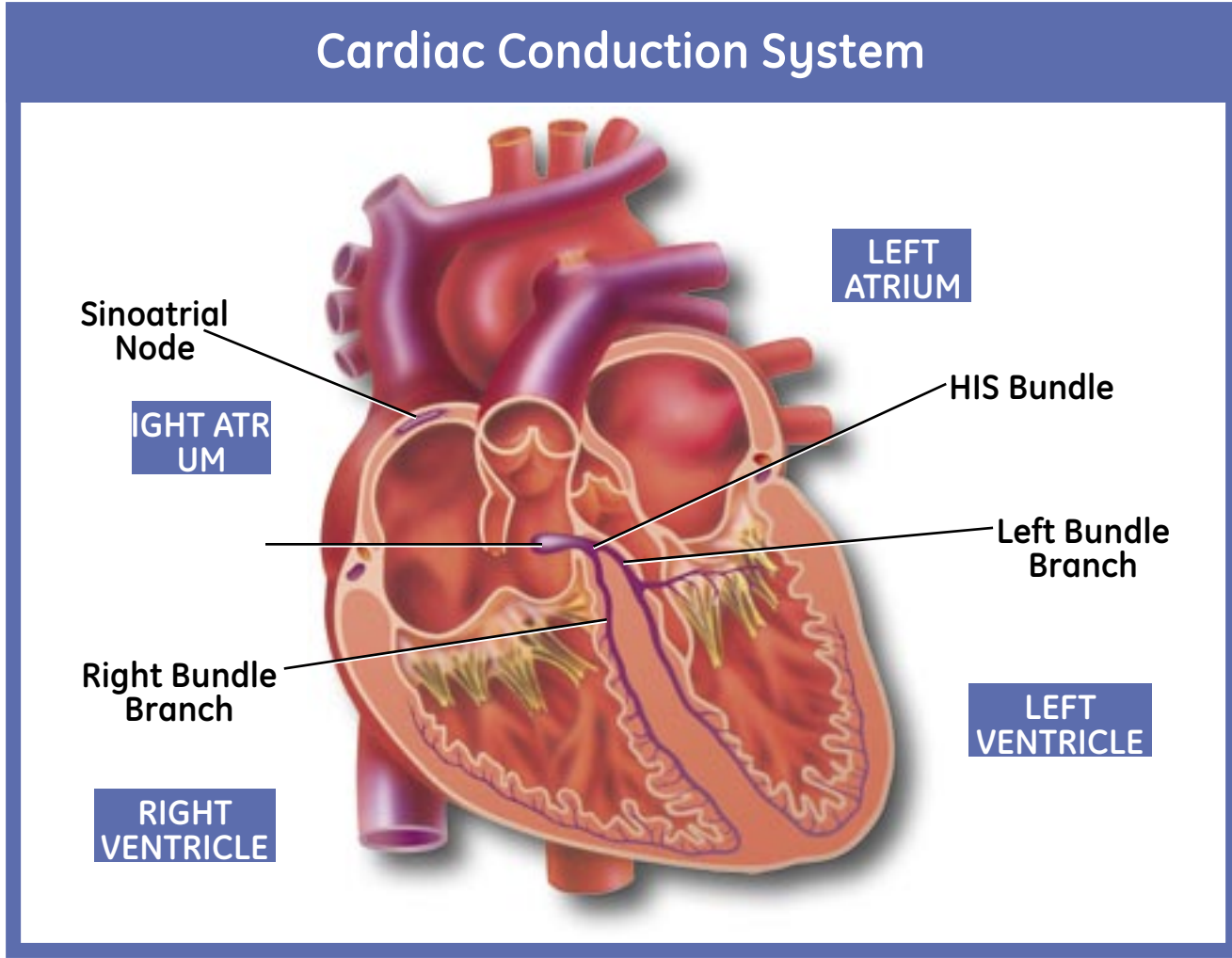


# Arrhythmia Recognition



### Sinus Rhythms

Heart Rate	Rhythm	P Wave	PR Interval	QRS
60 - 100 bpm	Regular	Before each QRS, identical	0.12 to 0.20	< 0.12

#### Normal Sinus Rhythm

#### Sinus Arrhythmia

Heart Rate	Rhythm	P Wave	PR Interval	QRS
Usually 60 - 100 bpm	Irregular	Before each QRS, identical	0.12 to 0.20	< 0.12

#### Sinus Tachycardia

Heart Rate	Rhythm	P Wave	PR Interval	QRS
> 100 bpm	Regular	Before each QRS, identical	0.12 to 0.20	< 0.12

#### Sinus Bradycardia

Heart Rate	Rhythm	P Wave	PR Interval	QRS
< 60 bpm	Regular	Before each QRS, identical	0.12 to 0.20	< 0.12

#### Sinus Arrest or SA Block

Heart Rate	Rhythm	P Wave	PR Interval	QRS
40 - 100 bpm	Irregular	Identical before each QRS. P to P interval may be fixed before and after the pause	0.12 to 0.20	< 0.12

### Supraventricular Rhythms

Heart Rate	Rhythm	P Wave	PR Interval	QRS
N/A	Irregular	Premature and abnormal. May be hidden	0.12 to 0.20	< 0.12

#### Premature Atrial Complexes — PACs

#### Premature Atrial Complex — Isolated PAC

Heart Rate	Rhythm	P Wave	PR Interval	QRS
N/A	Irregular	Premature and abnormal. May be hidden	0.12 to 0.20	< 0.12

#### Premature Atrial Complexes (Atrial Bigeminy) Every other beat is a PAC

Heart Rate	Rhythm	P Wave	PR Interval	QRS
N/A	Irregular	Premature and abnormal. May be hidden	0.12 to 0.20	< 0.12

#### Premature Atrial Complex with Aberrancy

Heart Rate	Rhythm	P Wave	PR Interval	QRS
N/A	Irregular	Premature and abnormal. May be hidden	0.12 to 0.20	Abnormal shape

#### Nonconducted Premature Atrial Complex

Heart Rate	Rhythm	P Wave	PR Interval	QRS
N/A	Irregular	Premature and abnormal. May be hidden	None	Absent

#### Atrial Tachycardia

Heart Rate	Rhythm	P Wave	PR Interval	QRS
140 - 250 bpm	Regular	Abnormal P before each QRS (difficult to see)	0.12 to 0.20	< 0.12

#### Atrial Flutter

Heart Rate	Rhythm	P Wave	PR Interval	QRS
A: 240 - 350 bpm V: Varies with conduction ratio	Regular	Flutter (F) waves usually the negative component of the flutter wave in II, III, aVF and positive in V1	N/A	< 0.12

#### Atrial Fibrillation

Heart Rate	Rhythm	P Wave	PR Interval	QRS
A: 350 - 650 bpm V: Slow to rapid	Irregular	Absent Fibrillatory (f) waves	N/A	< 0.12

#### Junctional Rhythm

Heart Rate	Rhythm	P Wave	PR Interval	QRS
40 - 60 bpm	Regular	Inverted in inferior leads; before, during or after the QRS may be absent	< 0.12	< 0.12

#### Accelerated Junctional Rhythm

Heart Rate	Rhythm	P Wave	PR Interval	QRS
60 - 100 bpm	Usually AV dissociation because of digitalis toxicity	May be sinus P wave (AV dissociation)	< 0.12	< 0.12

#### Junctional Tachycardia

Heart Rate	Rhythm	P Wave	PR Interval	QRS
Usually < 140 bpm	Regular	Inverted, absent or after QRS	< 0.12	< 0.12

### Conduction Defects

P Wave	PR Interval	QRS	Characteristics
Before each QRS, identical	0.12 to 0.20	> 0.12	RSR' in V1

#### Right Bundle Branch Block

P Wave	PR Interval	QRS	Characteristics
Before each QRS, identical	0.12 to 0.20	> 0.12	QS or rS in V1 and V2 ST elevation

#### Left Bundle Branch Block

P Wave	PR Interval	QRS	Characteristics
Before each QRS, identical	0.12 to 0.20	> 0.12	QS or rS in V1 and V2 ST elevation

#### Pre-excitation Syndrome

P Wave	PR Interval	QRS	Characteristics
Before each QRS, identical	< 0.12	Usually > 0.10	Delta wave distorts initial QRS

#### First-Degree AV Block

P Wave	PR Interval	QRS	Characteristics
Before each QRS, identical	> 0.20	< 0.12	Regular rhythm

#### Second-Degree AV Block — Type I (AV Wenckebach or Mobitz type I)

P Wave	PR Interval	QRS	Characteristics
Conduction intermittent	Increasingly prolonged	< 0.12	QRS dropped in a repeating pattern

#### Second-Degree AV Block — Type II (Mobitz type II)

P Wave	PR Interval	QRS	Characteristics
Sinus	Usually normal and identical (before and after a blocked impulse)	Broad > 0.12	Some P waves are not conducted

#### Second-Degree AV Block — 2:1 AV Block

P Wave	PR Interval	QRS	Characteristics
Sinus	Normal or prolonged	Narrow or broad	2:1 AV conduction

#### Third-Degree (Complete) AV Block

P Wave	PR Interval	QRS	Characteristics
Normal but not related to QRS	N/A	Narrow or broad	AV dissociation

### Arrhythmia Recognition (poster 1 of 2)

This is part one of two posters to assist healthcare professionals in recognizing basic arrhythmias. According to the Practice Standards for Electrocardiographic Monitoring in Hospital Settings (Circulation, 2004;110:2721-2746) in general, the mechanisms of arrhythmias are the same in both adults and children. However, the ECG appearance of the arrhythmias may differ due to developmental issues such as heart size, baseline heart rate, sinus and AV node function, and autonomic innervation.

ECG terminology and diagnostic criteria often vary from text to text and from one teacher to another. There are often several terms describing similar findings for example: Premature Atrial Contraction, Atrial Premature Complex, Atrial Extrasystole, Supraventricular Ectopic Beat, etc. It is important to correlate the ECG interpretation with the clinical observation of the patient.

#### Normal ECG Standards for Children by Age

Heart Rate (bpm)	0-1d	1-3d	3-7d	7-30d	1-3mo	3-6mo	6-12mo	1-3y	3-5y	5-8y	8-12y	12-16y
Mean	94	105	110	115	120	125	130	135	140	145	150	155
95th	122	122	128	138	148	158	168	178	188	198	208	218
5th	68	78	88	98	108	118	128	138	148	158	168	178
PR Interval (sec)	0.08-0.16	0.08-0.14	0.07-0.13	0.07-0.13	0.07-0.13	0.07-0.13	0.07-0.13	0.07-0.13	0.07-0.13	0.07-0.13	0.07-0.13	0.07-0.13
PR Interval (sec)	0.02-0.07	0.02-0.07	0.02-0.07	0.02-0.08	0.02-0.08	0.02-0.08	0.02-0.08	0.02-0.08	0.02-0.08	0.02-0.08	0.02-0.08	0.02-0.08
PR Interval (sec)	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	
QRS Interval (sec)	0.02-0.07	0.02-0.07	0.02-0.07	0.02-0.08	0.02-0.08	0.02-0.08	0.02-0.08	0.02-0.08	0.02-0.08	0.02-0.08	0.02-0.08	
QRS Interval (sec)	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	

All values 2nd - 98th percentile; numbers in parentheses, means. Adapted from *Pediatr Cardiol*. 1979;1:123.

This poster includes Premature Ventricular Conduction, Pacemaker Lead Placement, ST Segment Depression, Ventricular Rhythms, Pacemaker Rhythms, Full Compensatory Pause and ECG Artifact. The ECG rhythm strips display lead II as the top waveform and lead V1 as the bottom waveform. Classic examples are shown for each rhythm to provide basic visualization and avoid complexities. The intended use of this poster is to complement a text and/or course — in addition to a reference guide for arrhythmia recognition.

The most common ECG rate, interval, and duration measurements are from the following publications:

- Clinical Electrocardiography (Post Graduate Institute for Medicine).
- Understanding Electrocardiography (Mary Boulevaré Conover).
- How to Quickly and Accurately Master Arrhythmia Interpretation (Dale Davis).
- Principles of Clinical Electrocardiography (M. J. Goldman).
- Basic Dysrhythmias Interpretation and Management (Robert Huzar).
- An Introduction to Electrocardiography (Leo Shamoon).
- Interpretation of Arrhythmias (Emanuel Stein).