

# ECGs - Reading Between the Lines!

Interpreting ECGs can be one of the most difficult learning challenges for prehospital clinicians in all areas. Below freelance cardiac physiologist, Maxine Guillen, Paramedic and Continuous Professional Development expert, Andrew Ormerod, and Ambulance Clinician and globally-followed ECG skills blogger, Jason Winter, join forces to explain how to gain the skills and confidence needed to develop one of the most vital skills needed in the ambulance world - How to read between the ECG lines!

## Life in the slow lane ...

**Looking at the plethora of ECG books on my bookshelf I'm struck by words such as "easy", "simplified" and "rapid" in the titles. I guess the reasons for this are mostly marketing ones. After all, who wants to buy a book that states interpreting ECGs can be incredibly difficult and will take you rather a long time. Needless to say twenty three years ago I was told to read one of these books and I couldn't even get past the first page.**

Even though my formal training was four years long, only a fraction of classroom time was dedicated to this subject. My education in this respect then, consisted of gradually picking up snippets of information either from text books or from well-meaning work colleagues. Over many years, and mainly through experiential learning, I managed to construct a fairly decent understanding of ECGs. However, for me, it was only through teaching others that I was eventually able to plug the remaining gaps in my knowledge. Ten years down the line I then began to wonder why I ever found any of it confusing in the first place and why it had been such a long drawn out process.

One of the reasons I believe this subject is difficult to learn (and to teach) is because so many of us in the medical profession are required to attain this skill. Take my ECG classes for example. In any given group there is a considerable mixture of professions and abilities. These range from healthcare support workers to doctors, and everything in between. On the one hand you don't want to oversimplify the subject matter, for then the learner gains no understanding other than simple pattern recognition. On the other hand, you don't want to launch into something like action potentials when the learner is still struggling with recognising positive and negative waveforms. Too little challenge and the student doesn't progress; too much and the student retreats.

Another reason is that as learners we desperately want to get the "right" answer. Understandably new students believe it's the teacher's job to impart unambiguous information, and learning is simply a matter of information exchange. Granted, some

ECG concepts are fairly black and white, but there are a lot of grey areas whereby an ECG only forms part of a diagnosis. Take ST elevation, for example. There are a number of different causes for this finding, but unless you put it into some sort of clinical context you may never know the correct answer. Therefore, in this respect I believe the process of interpretation and the context is as important, if not more so, than simply trying to label an ECG straight off the bat.



Finding the right level for you can be a nightmare, and it doesn't help that cardiology is laden with a lot of confusing terminology. Thus I find a fair amount of my teaching time consists of explaining all the jargon. With the rise of the Internet we also have instantaneous access to a lot more information than we used to. But, I wonder if this makes it even more confusing for the learner. I certainly still have trouble sifting through good and bad material because whatever mode of education you use, it is all susceptible to inaccuracies, assumptions, and misunderstandings. Not to mention that as students we seem to accept anything that is passed down 'from above'. Reading a book, signing up for an e-learning course, or attending a seminar is a great start, but it doesn't automatically make you proficient. They definitely have their place, but my advice is to use them as a basis for developing your own knowledge through your own working practices, and perhaps more importantly take your time and question everything!

But surely things have changed since I was a student? And, perhaps I've unintentionally painted a rather gloomy picture. Certainly, in my profession, degree courses have become

more structured, and students are assigned mentors or are required to keep log books. However, even after all these years there is still a look of fear on my students' faces at the beginning of every seminar. I see them visibly relax when they realise they're not the only desperate souls out there struggling with this subject. Perhaps we just have to accept that whatever our profession, it is a long road to ECG competency, if we ever really get there. Once we realise this we can stop being so hard on ourselves. A medical student recently showed me his e-learning cardiology resources – on the first slide the tutor recommends an ECG book – sound familiar?

### Maxine Guillen: Cardiac Physiologist & Teacher



Maxine is a cardiac physiologist and teacher with over 20 years of experience. She is author and tutor of Cardio Rhythms' ECG Interpretation Seminar, the Advanced ECG Master

Class, and the ECG Instructors Course. She has to date authored and developed 3 e-learning modules for Cardio Rhythms Online, and is presently co-writing several e-learning modules with Jason Winter, currently under development.

She has worked in numerous hospitals throughout the UK specialising in both invasive and non-invasive cardiology techniques. She founded Cardio Rhythms in 2000 and has written and taught many ECG interpretation courses to cardiology students and other health care professionals alike. She is a member of the RCCP, is accredited by the British Society of Echocardiography, and was the lead ECG tutor and examiner for Guy's and St Thomas' MPI stress testing course. Aside from her qualifications in physiological measurement she also holds a PGCE in teaching & learning in higher education.

Maxine lives quietly in Bournemouth by the seaside with Oscar and their son Jack. As well as her work in cardiology she is an accomplished pianist and holds a first class undergraduate and postgraduate degree in music. She enjoys horse riding, loves watching tennis, and is trying to improve her Spanish!

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# Demystifying the Myths

## CPD

### by Andrew Ormerod

Continuing Professional Development (CPD) is not just about reading and recording; it is a very real and necessary part of our role in the NHS and independent ambulance services. It is not a management tool to hit key performance indicators (KPI) or a governing body quirk to cause unnecessary suffering or stress. In fact it exists to assist professionals in becoming skilled and well-informed employees.

CPD is an emerging field in pre-hospital care; succinctly described by the Health Professions Council (HPC, 2006) as:

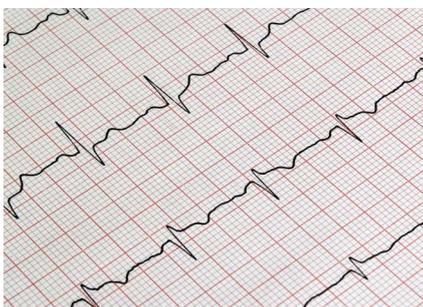
*'A range of learning activities through which health professionals maintain and develop throughout their career to ensure that they retain their capacity to practice safely, effectively and legally within their evolving scope of practice.'* (p.6)

Perhaps an easier way to conceptualise CPD is to think about a brick house, each building block representing a learning experience, which, when combined with other learning experiences, completes the whole structure. The secret to CPD is the ability to recognise and demonstrate how each of these blocks of knowledge creates a safe and effective professional, whilst being able to take a step back to evaluate and reflect upon your work.

**One of the more important stages of CPD is...RECOGNITION**, let's take an example:

You recognise that you have concerns about understanding electrocardiograms (ECG) and that you struggle with the basic waveform and recognition of a normal sinus rhythm. The fact that you have recognised you need a better understanding of ECGs is the biggest hurdle. Having unlimited access to online learning and development regarding interpreting ECG waveforms is advantageous in today's busy work / learning climate. Historically as clinicians, we would routinely rely on colleagues to share sample ECGs they have taken and give an explanation of the recording. However, data protection and patient confidentiality now frowns upon this ritualised practice.

Sibson (2008, p.74) states that CPD should be an activity 'at the discretion of the



individual and should be specific to their role and environment.' CPD is described as '...the profession's response to the increasing sense of accountability demanded by today's society' (p. 74). Lawton and Wimpenny (2003) suggest that CPD is the need to 'put one's house in order', indeed if you imagine CPD as the analogy described previously of a brick house, then you are the master of your own learning experience and builder of your own CPD.

**Step two of successful CPD is ... RECORDING**, let's take an example:

The Health and Care Professions Council (HCPC) states that registered professionals must present a written profile containing evidence of their CPD on request. CPD is assessed against specific criteria, Sibson (2008) suggests that each health professional should have a Professional Development Portfolio (PDP). Forde et al., (2009) describe said Portfolio as a 'collection of material put together in a meaningful way to demonstrate the practice and learning of a practitioner'.

**Step three of successful CPD is... REACTION**, let's take an example:

Sibson (2008, p.75) recognises that the driving force behind any CPD is how '...the CPD Activity has contributed to your clinical professional practice and has benefited the service user, the patient or carer'. Indeed Armitage (2011) recognises that '...there is a fundamental need for understanding in order to develop clinical skills and make informed clinical decisions based on underpinning knowledge and clinical reasoning'.

**Step four of successful CPD is... REFLECTION**, let's take an example:

The HPC (2010) cite that the lack of observable reflection in portfolios resulted in a significant figure of submitted portfolios being returned to the auditee. The difficulty lies with the ability to document reflection, some of which the individual may feel is private to themselves. The HCPC does not recommend any one model or template for reflective practice; however templates and models are available and can be used (see. Gibbs (2008) and the CPDme.com reflective diary).

**CPDme** was formed in 2009 with the aim of preparing and assisting people from various health and social care professions to keep an online CPD log, and to enhance their personal portfolios in order to meet the standards set by their governing body, as well as preparing them for interviews, reviews, and for all future engagements within their developing professions, and for staff new to higher education.

Our members enjoy access to our free CPD portfolio building iPhone application and four levels of website membership to streamline professional development recording using [www.CPDme.com](http://www.CPDme.com).

### Further Information and References

[www.CPDme.com](http://www.CPDme.com)

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## CPDme

Development for Life

### Andrew Ormerod



Andrew Ormerod is the founder of CPDme an online Continuing Professional Development (CPD) portfolio building website, he is also the developer of a free CPD portfolio smart

phone application. CPDme was created from Andrew's professional practice project whilst studying towards a master's degree at Bolton University. Prior to studying towards an MSc, Andrew was one of the first Paramedics to graduate with a BSc (Hons) in Paramedic Practice from the University of Central Lancashire.

Andrew is passionate about professional practice, and aims to simplify, demystify and encourage CPD for over 20 health and social care professions across the UK. He currently is involved with a project in Australia and New Zealand and will shortly launch an international business venture with SP Services (UK) Ltd.

Andrew is a Paramedic registered with the Health and Care Professions Council (HCPC) and works full-time for a large NHS ambulance trust.

# ECG Monitor - The Coolest Kit We Carry!

When I first started my training on 12 lead ECGs sometime ago now, I was amazed by the wriggly lines seen on the printout and monitor; finding out later, these are known as waveforms, that can give you so much information about the many conditions/ syndromes and pathologies that can affect the heart, I was then hooked on learning more. I remember thinking to myself back then this is the "coolest piece of kit we carry on our ambulance".

When it comes to ECG interpretation, I have said for many years now that training should be better for EMT's and paramedics. Hopefully many pre-hospital personnel would agree with me. They are mostly given a crash course mainly on "ACS or acute STEMI recognition" so it's left to ourselves to educate ourselves in ECG interpretation, to gain a level of competency to interpret 12-lead ECG's.

My advice would be to find a good book or ECG App or eLearning course that suits your own style of learning. This is achievable only through experimental learning. Also by taking part in online ECG discussion groups. You will only become thoroughly competent by viewing thousands of ECG examples that are now online and by taking part in group discussions. Repetition, I found, was my best way of learning to interpret ECG's.

## Classroom Theory

ECG education theory modules should have a good foundation of cardiovascular anatomy and physiology. Again, a lecture only on ECG education in my opinion is not ideally suitable for the novice. Access to online eLearning modules would also be an advantage. Classroom sessions should include ECG case presentations, because learning in groups will help students understand and retain information better. The students will gain a great deal of information and appreciation for subject matter if they're afforded the opportunity to learn in groups, sharing case studies with each other. I feel

that modules should be developed that give the student a detailed insight into the electrical anatomy of the heart, cardiac blood flow, cardiac cycle and cardiac muscle cell contraction (e.g. sodium/potassium pumps, action potential). If this was concentrated more over a longer period of time at universities,



students should have time to understand in detail how the ECG really works, and apply this in practice. Students should also learn how to read blocks on ECG paper; understand the fundamentals of Einthoven's Triangle and understand about vectors. It's also important that students should be able to calculate time and voltage using ECG paper. The most important part of ECG education is interpretation, because this tends to be the most difficult, in my opinion. Student needs to learn about waveform definitions and recognition. Good practice would be to have the students circle waveforms of different morphologies and calculate rate. It's paramount to the student's ability to grasp the information that is needed to interpret ECG's.

## Clinical Practice

Practical skill stations will help students be competent in ECG practice monitoring, electrode/skin prep and to understand why correct lead placement is so important.

Performing and interpreting 12 lead ECGs is non-invasive, but is being able to intubate, give drugs, and perform IV cannulation, and so on, at the same intensive skill level as ECG interpretation? The ECG machine is such a valuable diagnostic tool we carry on our emergency ambulances, so why does the training on ECG's across the globe not reflect this? Most observations we perform such as pulse, temp, heart rate etc are variables that are categorised as high or low, but a 12 lead ECG tell us much more about the patient's pathologies and conditions. I always find it important that for most observations we perform, for example blood pressure, we like to get at least three readings if we can: 1st (baseline), 2nd (comparison), and the 3rd looking for (trends). This should be the same for performing serial ECGs in suspected ACS and should be taught to all students.

My suggestion also would be to have nominated ECG Mentors in the ambulance service, or on every station if possible, so when a new graduate or anybody else is finding it difficult to grasp ECG interpretation, they can have some support out on the road. Ideally this mentor should have a folder of real patients' ECGs for training purposes. Another problem I have

come across is attitudes to learning and understanding ECGs. I have heard numerous times quotes from paramedics such as "if I can't treat it, I don't need to know about it" or "I am not a cardiologist, so why do I need to know that". A common thing I see is when pre-hospital staff record only a 3-lead ECG, they only look and print out lead II, but it only takes a few seconds to flick through the six leads to check for any other abnormalities that might be missed in the 3-lead ECG, like the axis deviation, lead misplacement or ST elevation/ depression, or reciprocal changes in other areas of the heart.

In the world we are living in now, as professionals we are responsible for our own personal development and continued professional development (CPD). We should be proud of our profession and how far we have come over the past two decades. ECG interpretation is a difficult skill to master; only practise will make you truly competent.

## Jason Winter:



Jason Winter has over 20 years of experience in emergency care, working in the UK and abroad, including the USA and South Africa. Jason was inspired to join the Ambulance service by

his father, who retired a few years ago after completing 42 years service. He has also worked in two major hospitals and has spent the rest of his career working in pre-hospital emergency care. He is now currently working as a clinician for an NHS Ambulance Service in the Midlands in the UK.

Jason has always had a passion for ECG education and training and enjoys the challenge of trying to make this sometimes difficult subject easier and more fun to understand. This has resulted in a vibrant community of ECG aficionados on Facebook. He is also the editor and creator of the ECG & Cardiology blog (formerly 12-lead ECG Experts blog) and ECG Lessons online blog. His other sites, listed below, also include probably the largest cardiology social networking page online, called "ECG & Cardiology Facebook Fan page", and ECG Study cards page that you will find on his Facebook. Jason also helped to develop an ECG iPhone app, and has his own ECG Training app coming out soon that will be available on all mobile platforms. all his projects combined reach a staggering 2-3 million people weekly! His interests and pastimes include Cardiology, ECG interpretation, aviation, flight simulation, flying light aircraft, (he completed his private pilots licence, back in 2005). Other interests include: travelling. He is also a big fan of online medical education blogs & websites. Jason has two children. Born in Barnsley, South Yorkshire, he now lives in Derbyshire.

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