

Episode 44: Take heart: How point-of-care cardiac diagnostics save time and lives

Josh Casey: Hi, I'm Josh Casey. Welcome to QuidelOrtho Science Bytes, your trusted source for diagnostic insights and innovations. Today we have a special extended podcast episode for you on a subject that is critically important to practitioners and patients alike. During the next 40 minutes, we will dive deep into how cardiac testing at the point of care saves time and saves lives. The evolution of cardiac diagnostics has come a long way – from 3-day enzyme testing in the lab to 12-hour serial biomarkers to the development and introduction of troponin first, as a 12-hour lab test to today where point-of-care high sensitivity troponin makes rapid single sample rule-out possible. In this episode, we'll discuss the importance of cardiac testing at the point of care, with two renowned experts on the topic, Doctors Martin Than and Paul Collinson. Both of our guests today have extensive experience on the frontlines of patient care and have witnessed firsthand how point-of-care testing can save time and save lives. Doctor Martin Than currently holds several positions in the field, including consultant specialists and director of research for the emergency department at Christchurch Hospital in New Zealand. He has authored 187 peer-reviewed journal articles on emergency medicine, cardiac care and diagnostics. Doctor Than is recognized worldwide for his research on the rapid diagnosis of acute coronary syndrome. Also with us today is Doctor Paul Collinson. He is presently a professor of cardiovascular biomarkers and consultant cardiologist at City Saint George's Medical School in London. Doctor Collinson has held clinical staff and university faculty positions in orthopedics, general in family medicine, cardiology and pathology. He has published over 300 papers and review articles, 281 abstracts and 15 book chapters. Doctor Collinson has also been recognized numerous times for his research by the American Association of Clinical Chemists, including the Outstanding Research Award in point-of-care testing, as well as the high test award, now the IFCC Award for Lifetime Achievement and Cardiovascular biomarkers. Doctor Than and Doctor Collinson have dedicated their lives to patient care and clinical research to improve the diagnosis and treatment of serious diseases. As we turn now to discuss cardiac testing at the point of care, we're so fortunate to have two of the world's foremost thought leaders here with us today to explore the key issues and insights.

Welcome, Martin and Paul, thank you for joining us.

Dr. Paul Collinson: Thank you for inviting us.

Dr. Martin Than: Thanks for the invite, yeah, it's good to be here.

Josh Casey: Let's start by talking about the role point of care cardiac testing has played in your experience in the emergency department. How has it helped your ability to care for patients? If we could start with you, Martin.

Dr. Martin Than: Yeah, thanks for that question. And perhaps before we start that, I'll divert to just a point of terminology. I mean, I guess, point of care is the label we're putting on these sort of tests, but, there's a tendency by doing so to give the impression that the test is fundamentally different from the tests that being done in the laboratory and maybe a better label just for the purpose of this conversation, just to make it clear what the advantages are, is that this is a whole blood test, a whole blood test that has similar analytical performance to the lab, that Paul actually has some thoughts



around that particular terminology, and I think it's important to get that feedback from him before we ask the question.

Dr. Paul Collinson: Yeah, I think that's right. We, in the laboratory, we normally separate blood into serum and/or plasma before we put it on the analyzer, but that's really because that's the way we've always done it. And the ability to actually measure in whole blood, if we were able to do it routinely in the lab, would in fact significantly expedite our turnaround time there. The concept of, of why it's, it's sort of, it's, there are whole blood assays. Which can conveniently therefore be done at the point of care because they can then be done on smaller pieces of equipment. And that's really what's driven this particular direction I feel.

Josh Casey: And that definitely makes sense and relates to, you know, the ability to care for patients alone if you're able to use whole blood versus having to separate, you're able to use more accessible, smaller equipment. Would you agree with that and, and sort of what are, what are some of the other ways that it has played an important role in the emergency department?

Dr. Paul Collinson: I mean if we look at it from a more global perspective. The ability to measure on whole blood in the emergency department has actually been a theme of all these systems that we put in. I mean, blood gas analysis is typically done on whole blood, and it's done in real time, and blood gas analyzers has started by measuring blood gases, but now measure electrolytes, glucose, creatinine. And you can really regard the current generation of analyzers for cardiac biomarkers as being essentially just the just the a step along the same road.

Dr. Martin Than: Yeah, so now we can actually sort of move on to answering the main question you asked us about how has it changed my ability to look after patients. We're going to get on, I think in the discussions we have and how does it help emergency department care in general, and that also has a patient benefit angle to it, but maybe if I just think about the individual patient and the decision making that sits around them, clearly having a result back quickly, as opposed to more slowly, uh, allows you to talk to a patient about their results at an earlier time point, and I think that's particularly important as it was yesterday when I was on shift, when I saw a patient who'd had some chest pain and was very worried about it, and you know, I was able to say really within, 15 minutes of them walking into the cubicle area where I was. Well, we've got a few more tests to do, but fundamentally, the tracing of your heart, your ECG, and your first test for your heart are both look really normal. And therefore, we can be reasonably sure you're, at this point in time, you're very safe and there's, you don't have a major heart condition happening and, you know, you can see the relief flooding into the, the person's face, and then, you know, that, that's a really nice thing to be able to do. You know, uh, to give that reassurance, and then you can say, OK, well, this is what's going to happen next. We've got to do another test in this particular case. But, all of a sudden, you know, their stay is already being transformed in terms of what it is. You know, too often, I think, you know, patients are there for a long period of time while they wait, both for a cubicle and then for the blood test, and then for someone to come and tell them what the blood test results mean. And that's quite a long and anxious wait. For patients, so I think, I think that's awesome. And then the on the other side, similarly, I saw patients, uh, in my most recent shift where in fact their first point of care troponin was pretty low, but not low enough, not ultra-low that would allow a decision on that test only. But the second test done 2 hours later had risen significantly. And again, are I would say, right, well, you've had your second test that suggests you've got a problem with your heart. But actually, this is good that we've been able to spot this at a point in time. You've currently got



excellent vital signs, and this is the mean and the plan going forward. And that patient was referred to cardiology and admitted to the cardiology ward much earlier than would have been feasible if we'd ridden on that assay. So I think in both cases, it's very handy. And then the third use case, which is a little bit more rare, is where we've got conflicting information. Most of the benefit of point of care, I think is on ruling out patients of having a heart attack, but there are, there are cases where ruling in is really important and a classic example would be where somebody. Has suggested a heart attack or an ECG but doesn't quite fit the criteria to open the Cath lab and bring people in at 11 o'clock at night from 30 minutes' drive away, or vice versa that the ECG looks abnormal but that history just doesn't fit. And having to wait an hour or an hour and a half for a confirmatory troponin result is ridiculous in that situation. And one can see how, obviously, if you have a result within a small number of minutes, you can actually make a definitive decision and activate or not activate accordingly. So that's a, a less common, but really important example of impact on patient care.

Josh Casey: Time to test and treat is critical. Certainly, anything heart-related, having the results faster gives you the ability to provide the care that they need and be specific about what's needed.

Dr. Paul Collinson: Yeah, I think basically Martin has put his finger on the common theme of the type of technology we're talking about, which is whole blood testing. And on small instruments which are suitable for point of care, is that it may expedite the time to decision. And this reduces uncertainty for the patient. And having sat in emergency departments as a witness rather than a protagonist, I can certainly say that that's a very, very attractive thing. And I think for the physician, it means that they can, they can make a treatment decision earlier and assign the patient to the right pathway. But what I think is often overlooked here is it also empowers the entire medical establishment because if the testing is done, for example, by a nurse practitioner, they can, there then empowered to actually make a decision which may be to drag the doctor over and say right, deal with this now, it won't wait, or perhaps this patient doesn't need to be waiting here, send them home.

Dr. Martin Than: Yeah, I, I think that's exactly right, Paul, and I was going to mention that under departmental management, but I think we can put it under this category as well, that troponin tests were something that came back later and in in reference to the nursing staff, they would just wait for the doctor to have looked up the results and eventually tell them what's happening. And the, you know, the changes along the lines of what Paul says was, well, if you're going to a machine that's going to give you a very quick result, our nurses tend to set their iPhones or smartphones, whatever they have to the turnaround time of the test. So, for the Cordell test, they'll set it for 17 minutes or 15 minutes. And then they will come and tell me and say, they've already written a little note saying, point of care test result was X, and they'll have probably, uh, memo'd me and we have all sort of voice communicators to say just letting you know that first test result was. And that then triggers a whole sort of series of things. Like, for example, that patient the question is, so the first. First point of care test results is really low. Can we move them out of the cubicle now? Because that patient we know now has a really low troponin and a normal ECG and is pain-free, so it's staggeringly unlikely to have some sort of critical clap in the emergency department. They can actually go back to a chair, and that cubicle is then freed up for someone else. So it actually empowers the nurse to rotate, uh, precious resources because real estate is scarce and always in a premium demand. So, um, I think Paul's point there is a really important additive.

Dr. Paul Collinson: And it means I can go and get a cup of tea.



Dr. Martin Than: Well, in fact, Paul, I, for that particular paper and I said, well, you know, you need another test in 2 hours, it, it's a lovely day when you're going to have a walk in the park actually. And uh so that's what that's exactly what they did. Yeah.

Josh Casey: Walk a walk in the park versus the night in the ED that's uh I think anyone will take that choice.

Dr. Martin Than: Yeah.

Josh Casey: Great. Well, thinking about, we touched on, you know, some of the evolution of cardiac diagnostics at the start of the conversation and thinking about the advancements that you've seen in point-of-care testing over the years. What have been some of the greatest innovations and specifically with cardiac testing, what tests, you know, beyond troponin, have you really come to rely upon and maybe the sort of rule out situations and related, where would you say there's a need for more improved diagnostic technology and testing?

Dr. Martin Than: Yeah, that's a good question. I think there's a couple of uhm main tests there that we would be adding to troponin in the right circumstances, and I'll come back to that in a moment, because that's an important caveat. The unexplained breathless patient is somebody for whom, if you don't know, whether they've got a history of heart failure or you can't explain the reason why they're critically unwell in front of you, being able to determine that it's likely that there's the volume fluid overloaded very quickly and initiate treatment for that is very handy. So I think natural peptides are a really handy thing to have on um a point-of-care device. And the other one is D-dimer with the caveat that you have to have very strict criteria about who gets the test, because it's a test where almost 50% of people will have a positive result. So, having easy access to the test, which is great, and a quick result is, is also great, but it's important we don't, you, the more people you test, the more 50% positives you'll get and the more that will drive downstream investigations. So, having said that, it's really useful if that's your specific question. Whether the patient has venous thromboembolism and you want information on that quickly, usually again for rule out rather than rule in, then it's really great to have a result in a small number of minutes as opposed to having to wait over an hour for the results to come back from the lab. Again, as Paul said in the earlier question, this is expediting time to decision-making.

Dr. Paul Collinson: I think there are also other areas as well though. I mean, some of the tests which we do in the lab take a long time and there's nothing really we can do about it. And if there is the capability to do it on the whole blood, actually at the point of delivery, this really makes a lot of difference. And I'm thinking particularly actually about drug testing because this is something that labs can do, but it's, it's either. A specialist exercise or it's sort of done on a big analyzer and takes time to set up. Whereas in fact, if you, if you're you, Martin, are faced with somebody who's unconscious, it's quite useful for you to know very rapidly if they are have on board something which um you should be aware of, and this is beyond just sniffing them to see if they reek of alcohol. So sort of the other more recreational pharmaceuticals. So this, that's, that's actually I think a particularly good area for where point-of-care testing has really come into play. And the, the other thing of course is some of course which is out, out with cardiac marks, of course, is just being able to say whether a lady is pregnant or not because if someone comes in with abdominal pain, they, I was always taught, if they're female, the first thing you make sure is they're not pregnant because that's something that you can do something about and can kill them if you miss the diagnosis.



Dr. Martin Than: Yeah I think there are both good add-ons there and certainly the unconscious patient it's nice to know what drugs or if there's a direct cause for that. Even in the non-unconscious person, we do quite a lot of paracetamol levels for intentional overdose of that drug, and, you know, it, it takes a while for that result to come back. So it will be, that's time-consuming too. So, and I agree it's a point-of-care pregnancy test would be very handy.

Josh Casey: Well, you've both mentioned time to diagnosis is a critical benefit. And so thinking of, you know, for somebody who's entering the emergency department with cardiac symptoms, um, you know, for, for providers and patients and their families who are anxious for answers, how do you balance the need for quick results with the risk of false negatives?

Dr. Paul Collinson: I think we've got two things that swing into play here. One is the ability of the test, and the other is the sort of clinical problem that you have. I mean, if a patient comes in with quite clear signs on the ECG, you don't hang around to do a troponin and you immediately dispatch them off to the cardiologist and hopefully it's the Cath lab to open up their artery, but the majority of people aren't like that, they're the easy ones really. Most people who come in and it's a bit unclear. And what diagnosis we have really seen over effectively the course of the last effectively 12 years is that as troponin result methodologies have become very, very sensitive, we have been able to compress the time to diagnosis and uh once upon a time we'd say, well, you measure it on a mission that's 6 hours, then it became 3 hours, then 2, then 1, and now we're saying, well, 0 and 1. And that, but that we were stuck or Martin was stuck, but the fact he had to wait until the lab had got a result back to him. And if you were somewhere that where the lab facilities were maybe 2 hours away or even non-existent, that was it. You were obliged to use a point-of-care system that was relatively insensitive. That wasn't, it was bad. It's just that instead of getting an answer in 1 hour or 2 hours, it would take you 6 hours to be certain. Whereas now we have high sensitivity troponin in whole blood, which can be used at point of care such as the Quidel system. And this immediately means that we're moving high-quality diagnostic troponin measurement straight into the hands of the emergency department. And they can then immediately plan rapid pathways and I mean, Martin's been at the forefront of this with the accelerated diagnostic protocols. But originally, he was limited by the fact that the troponin assays were not that sensitive.

Dr. Martin Than: Yeah I think you've made most of my points already Paul interestingly when we were initiating this discussion earlier in the podcast we used the expression time to decision-making and in this subsection we've been talking time to diagnosis obviously, you can improve the time to diagnosis, but really time to diagnosis only relates to people who have a positive result, because you're ruling in the likelihood of a myocardial infarction. Well that, although of course it could still be a myocardial injury, or it could be a myocardial infarction due to a non-coronary cause. So I don't think most of the time it's not improving your time to diagnosis, it's improving your time to decision-making, but I think that's an important distinction, though that terminology accelerated diagnostic protocol, and we actually call it now accelerated decision making pathway is that distinction I think is important because you probably don't always have enough information from the troponin result to make a diagnosis, but you, what you do have is enough information to make a decision. And so it's about expediting that decision-making, which quite often will be about sending the patient home and not necessarily then ignoring them downstream, but actually saying, well, our decision is that you can go home. It's not that you don't necessarily have a heart problem, we actually need to do some more tests, such as a coronary CT of the of their coronary arteries or a stress test of some sort. So it's the first step in the patient's journey in a lot of patients, rather than a diagnosis. And of course you can't diagnose not to have something very easily.



It's because we still don't know actually what the cause is, that's the commonest thing, as we say, well, we actually don't know what the cause of your chest pain is today, uh, but we're confident it's not something that's going to be, um, immediately fatal or serious for you. The concept of the pathway comes into the second part of your question around balancing the test results with the risk of false negatives and that pathway concept is critical in that we're never relying, as Paul said the you including ECG in this for the positive patients, but you're never relying on the, blood test result on its own it was always in combination with an ECG and the patient's presentation, and most guidelines now recommend some sort of structured approach to that, so that you can actually, in a consistent and reproducible fashion, stratify the patient's risk to from low to high in terms of a spectrum of likelihood of having coronary disease or angina at that point in time, and then apply the blood test result in combination with that and I think it's very important we understand that that's the way we're using it. That's how we avoid the risk, uh, of false negatives by carefully creating pathways which are designed to, in conjunction with the test result to minimize risk for those patients. So you shouldn't really get patients who, in a. That, uh, and who are being missed, and therefore the point false negatives is not quite true because I guess it applies to the test only. It's whether the pathway as a whole, may miss patients that could potentially come to harm. Although you could have a false negative pathway, true as well, the term false negative is usually applied to the test. Uh, so I do want to emphasize that this is a pathway approach, and you can set up the pathway to minimize the risk of missed events in those patients.

Josh Casey: Got it, got it. Makes sense. So earlier we touched on emergency department management and I'm wondering if you can speak to some of the ways that point-of-care cardiac testing helps improve or mitigate, you know, critical factors like patient wait times and turnover and even mortality rates.

Dr. Martin Than: Yes, thank you, that's a good question and as I said earlier that we're sort of separating the direct individual patient benefit to the more generalized benefit. There's no doubt and we have measured this quantitatively in a large study with thousands of patients now that it's possible to reduce the amount of time a patient spends in your department by using whole blood testing near the bedside with the point of care troponin test. So for us in our hospital, which sees 140,000 patients a year in our emergency department we've reduced our length of stay for this patient group by 30 minutes, which is not a number that sounds immediately big, but if you then multiply that amongst the 40 or 50 or so patients that are being investigated with a troponin during the course of every day, that multiplies up to a very large number very quickly. And we've calculated that we're saving about 8000 hours a year in patient time. And that saving not only applies to the patients that are having the troponin test in terms of length of stay but applies to every patient in the department in general. So if we look at the overall median length of stay, that has already reduced. Well, one would question, how is that possible if you're only doing troponin tests on the people with, for example, chest pain, how do you have this impact on all the patients in your department? And that's because chest pain is the #1 or #2 most common reason for a patient to present to an emergency department. And because there's the potential risk of them having a, a heart attack and an arrhythmia, then unless they look unbelievably well and young and it's very unlikely from the triage nurse's perspective, they'll get a high triage score, which is a triage 2, probably, which requires them to be, have an ECG and be assessed very quickly, usually within 10 minutes. And they will also be put in a cubicle that has monitoring in case they have a cardiac arrhythmia, and most emergency departments will have some limit on the amount of critical space they have for that sort of patient. So if you put your chest pain patients in those cubicles, and then you then wait quite a number of hours to get a first and a second troponin test back. That cubicle is blocked for a



significant length of time. And so if it's blocked, other patients can't get into there. So now we've got a patient in the waiting room who would really benefit from an assessment. Maybe if they've got a completely different presentation and condition like they, they've got a fever and they might have underlying sepsis, you can't assess that patient because we can't get them into the cubicle, there isn't a nurse available to start their work up, and that the doctor can't see them because they're out in the waiting room and they can't examine them there. So this is how this has a really big impact. If chest pain is your #1 or #2 presenting problem, and your cubicles are blocked by chest pain patients awaiting the troponin test, this has a backflow effect on your other patients. So hopefully I'm getting the message across about how this affects everybody because it really does. It's an amazing effect that we can affect everybody's care by focusing on this patient group.

Dr. Paul Collinson: I mean, just to come in on some of the points that Martin has raised and highlight them, the question of how long you wait before treatment has actually been very well studied all over the world, and basically, the longer you wait in the emergency department, the greater your chance of dying. And if you wait more than 12 hours, this is unfortunately the case in the UK quite a lot, the chance of mortality goes up quite significantly. So that's the sort of, you know, the hard science behind it, but then, the other thing it comes down to is something Martin alluded to right at the beginning. In terms of experience both for the patient and more importantly for the people that have come with them, it's absolutely miserable if you're just hanging around waiting to be assessed. I mean, you don't rock up to an emergency department for a good night out, I have to say. It's it's not very pleasant at all.

Dr. Martin Than: Maybe after a good night out, Paul.

Dr. Paul Collinson: Yeah, sometimes after a good night out. And, and I think the idea that you have your test done and then Martin says, oh you could just nip out for a quick walk, see you in two hours. That's very appealing because they'll go off with a light heart and then come back. Though I have to accuse you of rebranding, Martin, if you're accelerated diagnostic pathways and now accelerated decision pathways, it's clearly the great advantage you're calling it an ADP is you can then just change the words to fit to it.

Dr. Martin Than: Well, I actually remember presenting at a conference where I tried to change it a bit more, and I ended up with SDP and GDP under the guise of structured diagnostic uh structured decision making pathway or guided decision-making pathway, but none of those stuck.

Dr. Paul Collinson: I think you're stuck with ADP.

Dr. Martin Than: Yeah, well I think we are stuck with ADP. I think I'll just extend something you said around um the link between overcrowding and mortality. So for I'm an emergency department environment, these sort of things I'm going to say are very common knowledge, but outside emergency medicine, it may not be. Various countries have different targets for what the length of stay from arrival to discharge or admission should be. But quite often that's 4 hours. In our country in New Zealand, it's 6 hours. And there's two key things to mention about that. So first of all, if you are a patient or a patient arrives at an emergency department where 10% or more of patients have been waiting for 6 hours or more for admission or discharge, then the mortality of that patient and every patient around them is increased by 10% in 7 days. So this is again that back to the backlog effect I was describing. If you're quietly dying of sepsis in the waiting room, you're likely to do worse than if you're brought through, assessed and given antibiotics quickly. So overcrowding has a significant effect, and that 6-hour metric is a key one that we look at to because we know that when, when that gets high and it's going above 10%,



it isn't so good for patients. So ideally you would have a department where your 6 hours is being achieved, or under 6 hours is being achieved in about 90% of your patients. Now, on introduction in our hospital of this, um, point of care test, and we don't achieve 90% at the moment, we're working towards that at the moment, but we improved our 6-hour target percentage by 5 to 10%. So that's actually an amazing effect, really, that now we, we know that, subtly, and not directly on an individual patient basis, but the use of point of care troponin will across the board be improving mortality for our patient group.

Dr. Paul Collinson: I think it basically it's all about improving patient flow.

Josh Casey: So it sounds like it's really the benefits are to all patients, not just those who are there with cardiac symptoms. So, the final question I have for you today, what would you say to other medical professionals and emergency departments who are maybe not fully leveraging point-of-care cardiac testing and maybe relying too much on the lab or other modalities for diagnosis?

Dr. Paul Collinson: I think there are, there are two points I'm going to make and then I'm going to let Martin chip in. The first is that point-of-care testing is not a panacea. This is really very important thing to remember. I'm personally of the belief that people actually do too many tests in the emergency department, and they should be a bit more focused on what they're doing, and not just say, well, we're going to send a raft of tests off to the lab, and then we're going to look at what comes back and make a decision on what we do next. They should be very much more clinically focused; they should be doing the tests which are going to change their management. Well that's a sort of a comment from an old Bolshevik, I would say really when it comes to discussing testing. But directed testing I think is very important, but the other thing is that you've got to have a pathway that will exploit having a rapid test result. If you don't have your appropriate testing and your pathway to rapidly act on the result, you're never actually going to get anywhere. So I think it's – that's the most important thing I would say. I'm a great enthusiast for point-of-care testing, I think when appropriately applied. It can have really profound impact, and anything that reduces your length of stay in the emergency department is, I think, a marvelous thing, not least because it does all the good things that Martin's describing about reducing mortality, but it improves your experience being there and as I mentioned before, you don't go there for a good night out. So that I think is where I will lead into this and then pass it over to Martin to say. Why did he decide to go for point-of-care testing for putting cardiac marker testing in place in his institution?

Dr. Martin Than: Yeah, Paul, I think that follows on from the previous section we were just discussing. I think that the answer to that question is we had a burning platform which was, we knew that patients were waiting too long and therefore we knew that we were that harm was coming to them one way or the other and that we knew we didn't have the space to manage the patients we wanted, so this being a very large patient group, exploring point of care troponin was a very obvious next step when the tests become available. In terms of what I'd say to other medical professionals, to the enthusiasts, I'd say that, as Paul said about the putting this in place in an appropriate structure and pathway. This is critical. The change management and knowledge translation process for implementing point of care is complex and just needs careful thought. It's not difficult necessarily, but it does need to be thought through carefully and involves quite a number of stakeholders that have to be engaged and will involve a lot more input from nursing staff than maybe other test initiatives have done that are coming out of the lab, because the nurses will be driving the actual conduct of the test generally and also it is looking at the results when they become available on the machine. So, uh, I think it's a great thing to do, but just going to it with, um, eyes wide open, but it can't just be something you say, oh, we'll start



ordering that next week, uh, without doing a reasonable amount of groundwork first. To the skeptics, I'd say. that I can't imagine going back and I think that's usually the best answer to one of these questions about what would I say to other medical professionals. This happened also with the move from contemporary troponin, the high sensitivity. You know, I, I couldn't imagine going back. I mean, they are challenges and, and differences you have to understand around using a high sensitivity troponin, but the information it gives. and the ability to care for patients is so more efficient that you never want to go back from, in my opinion, and the same applies with point of care. No one that I work with would want to go back to not having point of care because it's had such a positive impact on what we do. And to me, that's the, where the rubber hits the road. It works, it makes a positive difference, and people want to keep it.

Dr. Paul Collinson: I think the other thing I would chip in as well is we have to consider what the alternatives are. I mean, one alternative to make the experience is to just vastly increase the number of beds, the number of doctors, number of nurses, the number of everybody else. Oh, and of course treble the budget, that goes without saying. And of course, practically, we simply can't do this. The resources are not available, but by optimizing process and using the enhanced decision-making we get with these whole blood point of care type systems, we can immediately achieve the same goals at a fraction of the price and that is the other thing I say to people when they say, well, it's more expensive. Well, yes, it is more expensive, but it's not more expensive when you look at the total cost of what you otherwise would have to achieve. So you have, in my view, one of three options. You either say, oh, we'll accept that we're giving lousy care with to the albeit to the best of our ability, it takes a long time, or we'll have this massive cost expansion, which we can't do. Well, why do that when you, you can use the people you've got more efficiently and they'll enjoy it as well. The the real thing that's come to me over all the years of doing point-of-care studies is that. People start by saying, oh, it's another task, and then shortly afterwards they say, oh, it's great, I've got a result, I can, I can act on it. It's this business of, that's become very fashionable to discuss empowerment. But the people like it, they like the fact that they can actually make the decision themselves, that they don't have to refer everything up, that it's not a we move outside this concept of command and control management, which is intrinsically inefficient.

Dr. Martin Than: Yeah, I think that's a really good point, Paul, and you've touched back on the impairments there, which, as I said, particularly relates to the nurses and in a number of locations where we've been working with departments, including my own, there's been a quite understandable hesitancy on the part of the nursing staff to say, yeah, you've just given me another task to do, that's, you know, that I don't want. But I can categorically say the nurses wouldn't want to go back either, because by doing time motion stop watch exercises, we've worked out that actually the time spent at the analyzer, which is 2 or 3 minutes, is way, way less than the direct patient care time that you otherwise have to spend with the patient during the course of their prolonged stay, whether that be nursing handovers or responding to the bell request from the patient to give them analgesia or to unwire them from their imprisoning telemetry leads and take them to the toilet, and then wait there while they, until they've finished and bring them back. So we've shown that actually we can save about two nursing shifts of time per day by using point of care. And that, I would say the nurses are the most powerful enthusiasts of all of this test. They really, really like having it.

Dr. Paul Collinson: I'd just like to make one other point as well, which is, science as much as anything else. In the studies we've done with the um Quidel Triage True, the, it's become apparent to us that it's a very, very powerful technology because we can see that it's potentially possible to send home between



50 and 60% of all the people who turn up within 30 minutes of them arriving at hospital, if we have it really efficiently arranged, and that to me is very, very attractive because I'm now in the age group where I might be trundling along to my local hospital with chest pain and what I want to know is that I'm either going to be in the Cath lab having my colleagues looking at my coronary arteries or going back home to drink a nice glass of wine, thank you very much as soon as possible.

Josh Casey: That's a really great perspective and I'm sure patients everywhere would also agree. But that's all the time we have for today. Thank you, Paul and Martin for sharing your insights on the value of point-of-care testing. We're so grateful for you and your time and knowledge. I hope everyone enjoyed the conversation. Please be sure to review the sections and links within the podcast description. You can always go back and listen again if you'd like more details. Thank you all for joining us. Please subscribe to QuidelOrtho Science Bytes, our monthly podcast brought to you by QuidelOrtho Corporation, where we are transforming the power of diagnostics into a healthier future for all. Until next time, take care everyone.