CORONERS ACT, 2003

SOUTH  *AUSTRALIA*

FINDING OF INQUEST

An Inquest taken on behalf of our Sovereign Lady the Queen at Adelaide in the State of South Australia, on the 8th, 9th and 10th days of April 2014 and the 24th day of April 2015, by the Coroner's Court of the said State, constituted of Anthony Ernest Schapel, Deputy State Coroner, into the deaths of Philip John Byrne and Jacqueline Weaver.

The said Court finds that Philip John Byrne aged 52 years, late of 356 Nangkita Road, Nangkita, South Australia died at Nangkita, South Australia on the 27th day of February 2012 as a result of pulmonary thromboembolism due to right calf deep vein thrombosis.

The said Court finds that Jacqueline Weaver aged 63 years, late of 6/29 Coburg Road, Alberton, South Australia died at Alberton, South Australia on or about the 23rd day of October 2012 as a result of pulmonary thromboembolus with contributing ischaemic heart disease.

The said Court finds that the circumstances of their deaths were as follows:

1. Introduction

1.1. These are the findings in respect of concurrent Inquests that were conducted into the cause and circumstances of the deaths of Philip John Byrne, aged 52 years, and Jacqueline Weaver, aged 63 years. It was considered appropriate to conduct concurrent Inquests due to a number of features of commonality between the causes and circumstances of their respective deaths. There is no other connection between the two deceased persons.

1.2. Mr Byrne and Mrs Weaver both died of natural causes. The most obvious feature of commonality between the two deaths is that both deceased persons died from a pulmonary thromboembolus[1]. Other features of commonality included the fact that both deceased persons died suddenly in the community and not in a hospital setting where it is not uncommon for patients to die from this cause. As well, in neither case was the pulmonary embolus diagnosed prior to death. Nor was the risk of it identified in either case. However, in the period leading up to their deaths both deceased persons had presented to general practitioners with symptomatology including calf pain that was possibly suggestive of an underlying condition known as deep vein thrombosis (DVT), a well understood possible consequence of which is a fatal pulmonary thromboembolus.

1.3. The Inquests examined the issue as to whether a DVT or pulmonary embolus should have been diagnosed in each instance and whether either of the deaths were preventable. For the reasons that follow the answers to these questions are that a DVT should have been diagnosed in each case and that both deaths were preventable.

2. Deep vein thrombosis and pulmonary thromboembolus

2.1. It is as well to set out here the evidence that was produced to the Court in relation to the pathology involved in DVT and pulmonary embolus and the methods by which either condition might be diagnosed.

2.2. A DVT is a thrombosis, or blood clot, that can form in the deep veins of the legs. The Court heard evidence from a number of different sources as to the possible causes of, and the risk factors associated with, the formation of a DVT in the leg of an individual. They included recent surgery, immobility from recently being bed-ridden or from long haul air travel, disseminated malignancy, prothrombotic disorders that may be genetically inherited and some types of hormone replacement therapy.

2.3. A thrombosis may form in the veins of other parts of the body including the arms and the pelvis. The arms are a less likely source of thrombosis that might have significant complications. Thrombi within the arms are usually smaller and less likely to have fatal consequences if they dislodge. As far as the pelvis is concerned, I heard evidence that thrombi originating in the pelvis can embolise and can cause life

[1] In these findings the condition may also be variously described as a pulmonary embolus or pulmonary embolism

threatening thromboembolism, but the majority of fatal emboli are the large ones that originate from the big veins of the leg, particularly the veins above the knee. A DVT may also form in the deep veins of the lower leg. In my view the evidence was clear that the vast majority of DVTs, that is to say well over 90% of them, commence in the deep veins of the calf.

2.4. Embolisation of a DVT can occur when a thrombus breaks or detaches itself from its site within a deep vein of the leg and travels in the circulating blood. The resulting thromboembolus will travel in the venous system to the heart and then to the lungs through the pulmonary arteries. The pulmonary arteries divide to enter the lungs and at that point the thrombus, which has embolised at that location, can become jammed and block the vessels. This condition is termed pulmonary thromboembolus. As all the blood in the body has to circulate through the lungs to gain oxygen, the effect of thrombus blocking the pulmonary arteries is to stop the circulation. Rapid death usually occurs as a result. Evidence was given, however, that a thrombus from a vein in the legs might only partially block the pulmonary arteries in which case fatal consequences may not necessarily occur depending upon the extent of the occlusion. Nevertheless, the potential for fatal consequences of a DVT is real and timely diagnosis of a DVT is a matter of great importance.

2.5. Signs and symptoms of a DVT can include pain within the calf of the leg, swelling of the affected leg and heat at the affected location. It is said that a DVT cannot be reliably diagnosed or excluded on clinical examination alone.

2.6. Signs and symptoms of a pulmonary thromboembolus can include chest pain, palpitations of the heart and shortness of breath.

2.7. The presence of a DVT in the patient's leg can be detected by way of ultrasound which is the definitive method of diagnosis. There is a blood test known as a D-Dimer test that, in the first instance, a clinician might perform in respect of a suspected DVT. A positive test is generally indicative of the presence of clotting within the patient's circulation. Where there are clinical signs and symptoms that have given rise to the suspicion of a DVT, a positive D-Dimer test might strengthen that suspicion which would then lead to a definitive ultrasound test. A negative D-Dimer test is consistent with there being either no clotting within the circulation or clotting that would probably not have serious consequences. In respect of the patient

who has a suspected DVT, reassurance might be derived from a negative D-Dimer test. Alternatively, in cases of suspected DVT the clinician might proceed straight to an ultrasound test. If a DVT is diagnosed by way of ultrasound, treatment is administered usually by way of blood thinning medication such as warfarin or heparin. Generally speaking such treatment is successful. This treatment is known as anticoagulant treatment. Expert evidence was to the effect that death from the complications of a DVT is very unlikely once appropriate anticoagulation has commenced. In short, deaths by way of pulmonary thromboembolus caused by a DVT in the first instance are preventable if the diagnosis of a DVT and/or a pulmonary thromboembolus is made prior to death.

2.8. A pulmonary thromboembolus can be diagnosed prior to death by way of a CT pulmonary angiogram. There are various methods of treatment.

2.9. A post-mortem examination by way of a full autopsy can identify a pulmonary thromboembolus as the cause of death. In the cases that are the subject of these Inquests a post-mortem examination did identify pulmonary thromboembolus as the cause of death in each instance. As well as identifying a pulmonary thromboembolus, dissection of the calves of the legs of a deceased person might also reveal evidence of a DVT in situ, or at least its remnants after the DVT, in part, has embolised and moved out of the leg into the circulation. This pathology was revealed in the case of Mr Byrne. In the case of Mrs Weaver dissection of the legs did not occur at post mortem and so a DVT was not identified in her case. However, the evidence demonstrated that the origin of the pulmonary thromboembolus in her case must have been a DVT in one of her legs. More of that later.

3. The post-mortem examination and cause of death of Mr Philip Byrne

3.1. Before discussing Mr Byrne's post-mortem examination I should say something about the circumstances surrounding his collapse and death. Aside from pain and swelling in Mr Byrne's right leg, for which he had recently seen two general practitioners as well as a physiotherapist, Mr Byrne had nothing significantly wrong with his health. According to Mr Byrne's wife, Jennifer Byrne, on the day of his death he had been in good health and had been watching television at their home near Mt Compass. While Mrs Byrne was cooking in the kitchen, her attention was drawn to a gasping sound from the lounge room. Mr Byrne had collapsed on the sofa and was unresponsive.

An ambulance was called and despite resuscitative efforts Mr Byrne was declared deceased at his home. Mr Byrne's death was sudden and quite unexpected.

3.2. Mr Byrne's autopsy was conducted by Dr Karen Heath who is a forensic pathologist at Forensic Science South Australia. Dr Heath's report was tendered to the Inquest[2]. The relevant anatomical findings were that Mr Byrne had massive bilateral pulmonary thromboembolism and early bilateral pulmonary infarcts. Thromboembolic material was identified occluding the right and left pulmonary arteries and was distributed within the central pulmonary blood vessels. Histological examination of the lungs showed intense pulmonary congestion and very early pulmonary infarction. Extensive DVT was identified within the right leg both below and above the knee. Histological examination showed recent thrombus arising on a background of older thrombus of approximately one to three weeks in age. Other relevant findings included the fact that the circumference of Mr Byrne's right calf, which was the affected calf, was 39cm whereas the circumference of the left calf was greater at 41cm.

3.3. Dr Heath expressed the cause of Mr Byrne's death as pulmonary thromboembolism due to right calf deep vein thrombosis. I find that to have been the cause of Mr Byrne's death. It is obvious and I so find that the pulmonary thromboembolism that occluded Mr Byrne's pulmonary arteries and caused his death had originated from the right calf DVT. I also find that there had been thrombotic material in Mr Byrne's right calf for a period up to three weeks prior to his death. That finding is made on the basis of Dr Heath's finding that older thrombus of approximately one to three weeks in age was located within Mr Byrne's right calf.

4. The post-mortem examination and cause of death of Mrs Jacqueline Weaver

4.1. Mrs Weaver was located deceased at her unit at Alberton by her daughter Ms Melanie Weaver. This occurred at about 5pm on the evening of Tuesday 23 October 2012. According to Ms Melanie Weaver the last time she had seen her mother alive was the previous afternoon when her mother was fine. Mrs Weaver was an active woman. She and her daughter had been walking together that day.

[2] Exhibit C3a

4.2. Some weeks before this, Mrs Weaver had attended on a number of occasions at the clinic of a general practitioner and had complained variously of calf pain, chest pain, palpitations and shortness of breath. During the course of these presentations she would be accurately diagnosed with diabetes, not from the symptoms that I have just described, but from blood tests. According to Ms Melanie Weaver, and also to Mrs Weaver's partner Mr Donald Bills, Mrs Weaver had been experiencing some personal difficulty in respect of issues connected with her former husband's suicide that had occurred earlier in 2012. However, according to both Ms Melanie Weaver and Mr Bills, there was no suggestion that Mrs Weaver had complained of any significant medical problems to them. Mrs Weaver's death was sudden and quite unexpected.

4.3. Mrs Weaver's autopsy was conducted by Dr Neil Langlois, a forensic pathologist at Forensic Science South Australia. Dr Langlois' post-mortem report was tendered to the Inquest[3]. As well, Dr Langlois gave oral evidence at the Inquest. The significant findings at post-mortem included the existence of acute thromboembolus occluding the left and right pulmonary arteries. There was as well organising pulmonary embolus in the right lung pulmonary artery. There were also infarcts within the right lung. Dr Langlois also found significant narrowing of the ostium to the right coronary artery that might have compromised the ability of the heart to function and could predispose to sudden death most commonly resulting from an arrhythmia when the heart is under strain, in this case, following a massive pulmonary thromboembolus. However, there was no previous ischaemic or acute ischaemic damage to the heart. In his oral evidence before the Court Dr Langlois said that in a case such as this where death has occurred suddenly and there is fresh thromboembolus occluding the lungs, it would be unreasonable to consider any cause of death other than the thromboembolus. The role of the ischaemic heart disease was to have rendered Mrs Weaver possibly more susceptible to dying from the thromboembolus. He stated that it was the thromboembolus that had killed Mrs Weaver.

4.4. Dr Langlois expresses the cause of Mrs Weaver's death as pulmonary thromboembolus with contributing ischaemic heart disease. I find pulmonary thromboembolus with contributing heart disease to have been the cause of Mrs Weaver's death.

[3] Exhibit C20

4.5. As indicated earlier, Dr Langlois did not dissect either leg in an effort to identify a possible DVT as the origin of the fatal pulmonary thromboembolus. Thus there is no direct evidence of the origin of the fatal pulmonary thromboembolus. The evidence suggested that it would be highly unlikely for the embolus to have formed within the lungs themselves. It came from a remote source somewhere within the body's circulation. I will return to the evidence as to the possible origin of the pulmonary thromboembolus in a moment.

4.6. As indicated above Dr Langlois reported both acute and organising pulmonary thromboembolus as well as infarction within the right lung. These findings had some significance in terms of the length of the duration over which Mrs Weaver may have been experiencing thrombosis in another part of her body. In his oral evidence before the Court Dr Langlois explained that significance. The acute or fresh thromboembolus was the clot that had moved, in his opinion from one of the legs, and had impacted into the left and right pulmonary arteries sufficient to have obstructed the flow of blood and to have caused her death. That was an acute event which I took to mean an event that had occurred in close proximity to the moment of her death. However, in Dr Langlois' opinion there was evidence that there had been an earlier embolic event or events that had not caused her death. He explained that a clot may not be big enough to block the blood vessels and cause death, in which case it will lodge in one of the large vessels where it becomes stuck and cannot proceed any further. This would be followed by the natural processes of the body in attempting to deal with and remove the clot. This process is called organisation[4]. As part of the healing process channels may be created within the thromboembolic material that will allow blood to flow through the clot. This process takes some time to develop. In addition, although the thromboembolus has not been sufficiently large to be fatal, it may be large enough to have some adverse effect by blocking off blood supply to the lung causing parts of the lung to die. This is known as infarction[5]. As explained by Dr Langlois, the presence of organising thromboembolus and the presence of infarcts imply that there has been an earlier event, not sufficient to cause death, but sufficient to cause damage to the lung and show evidence of previous thromboembolus. Dr Langlois was asked as to whether, therefore, the thromboembolus material could be aged. He told the Court that this was a difficult thing to achieve. However, he said

[4] Transcript, page 120
[5] Transcript, page 122

that the old thromboemboli clots having recanalised, that is to say broken up with channels enabling the flow of blood, meant that this had occurred over a long period of time; his estimation would be '*around a couple of months*'[6]. The other material was also difficult to age but would be aged somewhere between that couple of months and the occurrence of the more acute thromboemboli. The infarcts in his opinion were probably only a few days old. He said:

> 'So we have thromboemboli that are probably some months old, there's some others that are probably in the order of one to three weeks old, and we have some infarcts that are probably in the order of a few days old, and as I say, these are very rough estimates because of the lack of the guidelines and the variability of healing processes, but in that broad context, that's the sort of age I would ascribe to the changes I could see on the microscopic sections.' [7]

Dr Langlois gave further evidence about the significance of those estimations when examined in conjunction with Mrs Weaver's known activities earlier in the year and with her signs and symptoms on presentations to a general practitioner some weeks prior to her death. I will return to a discussion of those matters when dealing with Mrs Weaver's activities, in particular her overseas travel, and the presentations to her general practitioner following that overseas travel.

4.7. As to the source of the thromboemboli, Dr Langlois told the Court that well over 90% of clots that give rise to thromboemboli will originate in the calf of the leg. Dr Langlois gave evidence that in his opinion it was not necessary to dissect Mrs Weaver's legs in order to be confident that the thromboemboli had originated from the calf.

4.8. Dr Langlois told the Court that he doubted that the thromboemboli could have originated from the arms due to the fact that the veins of the arms are not as large and therefore would not be expected to give rise to the degree of thromboembolic material that he identified in this case. The other site that Dr Langlois stated might conceivably have been the origin of the thromboemboli would be in the inferior vena cava which is the main vein within the abdomen, but he examined this vessel and found no evidence of thromboembolus within it. On that basis he suggested that the only reasonable sites left to consider would be the lower limbs[8]. Dr Langlois also stated that he doubted that the thromboembolus had occurred in situ, that is to say

[6] Transcript, page 122
[7] Transcript, page 122
[8] Transcript, page 126

within the lungs, as there was an absence of pulmonary artery atheroma and an absence of any indication of disease at the pulmonary site. Dr Langlois acknowledged a possible scenario of the thromboembolus having originated within the groin of the deceased.

4.9. Evidence was given in the Inquest by Professor John Cade. Professor Cade gave evidence as an independent expert. He provided an expert overview in relation to the clinical management of both Mr Byrne and Mrs Weaver. Professor Cade is Principal Specialist in Intensive Care at the Royal Melbourne Hospital. Apart from being an expert in the field of intensive care medicine, Professor Cade also has considerable expertise in relation to thrombosis and haemostasis. His first doctoral thesis was in the field of thrombosis and much of his research since and his publications over the years have been in that field. In the course of his evidence before the Court Professor Cade spoke of the possible anatomical origins of thromboemboli of the kind under discussion in this case. He suggested that the majority of DVTs, that is well over 90%, commence in the deep veins of the calf. He also stated that the great majority of fatal emboli are the large ones that emanate from the large veins of the leg, particularly the veins above the knee. Professor Cade suggested that it would almost be a 100% likelihood that Mrs Weaver's DVT originated in the leg or in the calf[9]. This supports Dr Langlois' view that the leg was the site of a DVT and the origin of Mrs Weaver's pulmonary thromboembolus. I have accepted the evidence of both Dr Langlois and Professor Cade as to the likely origin of the pulmonary thromboembolus.

4.10. As will be seen, Mrs Weaver complained of the existence of right calf pain some weeks prior to her death. The origin of this pain was not identified at the time. As also will be seen, the age of the embolic material found at autopsy is not inconsistent with the material having originated from the leg at or around the time of Mrs Weaver's complaints of calf pain. I was satisfied on the balance of probabilities that the thromboembolic material, both the old and the acute, originated from Mrs Weaver's right calf. The finding is made despite the absence of direct evidence of the same as might have been revealed by dissection of the legs at post mortem.

4.11. The Court is of the view that a post mortem examination that identifies a pulmonary thromboembolus as the cause of death should in most cases include an examination of

[9] Transcript, page 254

the calves of the deceased person as it did in the case of Mr Byrne. This is especially necessary in cases such as these where the deceased person dies in the community and where the death is sudden and unexplained. It may well be that in such cases opportunities to have diagnosed the underlying pathology before it took on fatal consequences will need to be examined in the coronial context as was the situation here.

5. The death of Mr Philip Byrne

5.1. Mr Byrne and his wife lived on a property near Mount Compass. He had been a patient of the Mount Compass Surgery where his clinical notes date back to 1995. Mr Byrne had a documented past medical history of high blood pressure. He also had a history of experiencing stress and depression. In 2012, not long before his death, Mr Byrne asserted to his general practitioner that he had a past history of a DVT in the right leg. This is not mentioned in the clinical notes relating to Mr Byrne that were kept at the Mount Compass Surgery. There is no other known record of such a history. His general practitioner, Dr Phillip Duguid of that practice, in his evidence told the Court that Mr Byrne had told him about this history but that Dr Duguid did not know when this previous episode of DVT had occurred. He did say to the Court that he had known about this previous DVT at a time before he saw Mr Byrne in February 2012. Mr Byrne's presentations in February 2012 will be the subject of discussion in a moment, but it appears from Dr Duguid's evidence that Mr Byrne had raised the issue of a previous DVT out of apparent concern that he was presenting with another and that that was the reason why Mr Byrne consulted the surgery in that month. Dr Duguid told the Court that although there is no record of Mr Byrne's previous DVT, he was nevertheless convinced by Mr Byrne that he had experienced a previous DVT. In fact Dr Duguid told the Court that Mr Byrne was able to supply some measure of detail about the previous DVT in that Mr Byrne had said that it had followed an arthroscopy and that he had been placed on short term warfarin anticoagulant medication. All of this rang true with Dr Duguid.

5.2. The only other matter of relevance in respect of Mr Byrne's history was that in October 2011 he had been referred to an orthopaedic surgeon with a painful right knee as a result of which arthroscopic surgery was performed on 17 November 2011 to repair a torn medial meniscus with a parameniscal cyst. On 23 November 2011 Mr Byrne saw Dr David Ramsay of the Mount Compass Surgery in respect of a sore right

calf where the need to exclude the presence of a DVT was identified. As a result ultrasound diagnostic imaging was ordered and the presence of a DVT was excluded. Mr Byrne was seen by Dr Judith Hamel on 24 November 2011 in respect of that result. It was noted that the cramping involved in the sore calf was settling with time. I have considered whether this episode, involving as it did the exclusion of a DVT, might have been confused in Dr Duguid's mind with what he says Mr Byrne told him in the following February about his having a history of DVT. This to my mind seems highly unlikely because the clear clinical notations in Mr Byrne's medical record at the Mount Compass Surgery indicate that the presence of a DVT had been excluded in November 2011 and that Mr Byrne must have appreciated that. To my mind Mr Byrne was referring to something else when he saw Dr Duguid in February 2012, that is to say a real previous DVT. I am satisfied that Mr Byrne did tell Dr Duguid about a previous DVT and that in fact he had experienced a previous DVT. It would seem odd that Mr Byrne would invent a previous history of something so specific, including as it did an account of the circumstances in which he had experienced it together with the treatment, unless it was all true. Dr Duguid himself also had no reason to ascribe a previous medical history to Mr Byrne that did not exist.

5.3. Mr Byrne's relatively minor operation on his knee in November 2011 is unlikely to have precipitated the DVT that would exist in February 2012. There is no evidence that the right calf pain that existed in November 2011 persisted until February 2012.

5.4. On Monday 13 February 2012 Mr Byrne presented to Dr Duguid at the Mount Compass Surgery. Dr Duguid recorded that Mr Byrne described a painful right calf that had existed since the previous Saturday. Dr Duguid also noted that Mr Byrne had stated that on the previous Thursday he had walked a few kilometres in different boots.

5.5. Dr Duguid gave oral evidence in the Inquest. He told the Court that he examined Mr Byrne on this occasion and was specifically looking for evidence of DVT and found none. It is clear from the clinical notes of this attendance that Dr Duguid was considering a DVT as a differential diagnosis because he noted that he performed a Homan's test which is specific for DVT and that it was negative. He also noted that capillary circulation was good and normal. He also measured Mr Byrne's individual calves and in fact the left calf was slightly thicker than the affected calf. It was on

this occasion that Dr Duguid noted what he believed he was told by Mr Byrne about a previous history of DVT. He noted this in the following way:

'PH R DVT'

This was shorthand for previous history of right DVT. Dr Duguid also noted that while Mr Byrne mentioned the walk and the new boots on the previous Thursday, he did not describe any trauma or pinging within the calf on any occasion. Mr Byrne's reference to the Thursday walk and the new boots sounds very much like nothing more than his best guess as to what might have caused the pain to his leg.

5.6. Dr Duguid did not note a specific diagnosis within the clinical record, but told the Court that he felt that Mr Byrne had a grade 1 strain of the muscle within his calf. He did not believe that Mr Byrne had a DVT. He was reassured about this because Mr Byrne was a fit, healthy man who walked actively and was not overweight. There was no sign of DVT insofar as there was no swelling, varicose veins or tenseness and firmness, no indications of poor circulation to the toes and there had been the negative response to the Homan's test. In addition the localised pain did not have any relationship to the position of deep veins. The apparently affected muscle was well away from those deep veins[10]. Dr Duguid did acknowledge, however, that Mr Byrne did have a risk factor for DVT insofar as he had described a past history of DVT.

5.7. In cross-examination by Ms Thewlis, counsel assisting, Dr Duguid acknowledged that he excluded DVT on clinical examination alone[11] and that he did not consider it necessary to send Mr Byrne for an ultrasound. Dr Duguid also stated to the Court that he had placed some significance on the fact that Mr Byrne had undergone an ultrasound one week post operatively in November 2011 and that there had been '*absolutely no evidence of a DVT in the higher risk period*'. I took that to mean that he considered Mr Byrne was at much lower risk of a DVT in February 2012 than he had been in the previous November, meaning that if he was ever going to develop a DVT it was more likely to have occurred in the November. Dr Duguid said that all this reassured him, together with the clinical findings of his examination on 13 February 2012, that Mr Byrne did not have a DVT[12]. Dr Duguid also referred to an application of the Wells DVT diagnostic criteria. Tendered to the Court was a version

[10] Transcript, page 29
[11] Transcript, page 40
[12] Transcript, page 41

of what is known as the 'DVT Probability: Wells Score System'[13]. This document was tendered in evidence through Dr Duguid. Dr Duguid told the Court that if he suspected a DVT he would address the diagnostic criteria set out in this document. The document in question sets out nine separate criteria based upon clinical findings. One point is assigned for each of the first eight findings. In respect of the last finding, an alternative probable diagnosis results in the deduction of points. In respect of Mr Byrne, Dr Duguid said that on the Wells Criteria his score was 0 or less, which signifies a low probability of DVT. The nine criteria are as follows:

> 'Paralysis, paresis or recent orthopedic casting of lower extremity
>
> Recently bedridden (more than 3 days) or major surgery within past 4 weeks
>
> Localised tenderness in deep vein system
>
> Swelling of entire leg
>
> Calf swelling 3cm greater than other leg (measured 10cm below the tibial tuberosity)
>
> Pitting edema greater in the symptomatic leg
>
> Collateral non varicose superficial veins
>
> Active cancer or cancer treated within 6 months
>
> Alternative diagnosis more likely than DVT (Baker's cyst, cellulitis, muscle damage, superficial venous thrombosis, post phlebitic syndrome, inguinal lymphadenopathy, external venous compression)'

5.8. It will be seen that this document does not mention a previous DVT as a risk factor to be considered when assessing whether a patient has a new DVT. Dr Duguid acknowledged that he believed Mr Byrne had such a risk factor. In addition, it is difficult to see how alternative diagnoses could have been said to be objectively more likely than DVT in Mr Byrne's case. I am not certain that an exclusion of DVT based on this document could be accorded much weight in the case of a man such as Mr Byrne who had an acknowledged risk factor for the development of DVT.

5.9. On the same day, Mr Byrne attended and sought treatment from a physiotherapist at Mount Compass, Ms Penelope Chynoweth. Ms Chynoweth gave evidence in the Inquest. Mr Byrne presented with the right calf pain that he had described to Dr Duguid. Ms Chynoweth would see Mr Byrne about this again on 15 February 2012, 17 February 2012, 20 February 2012, 22 February 2012 and 25 February 2012, all in connection with the calf pain. Mr Byrne died on 27 February 2012, two days after he

[13] Exhibit C17c

was last seen by the physiotherapist. During the period over which he was seeing Ms Chynoweth, Mr Byrne would also see another doctor at the Mount Compass Surgery about the pain. This was Dr Judith Hamel whom Mr Byrne consulted on 16 February 2012. There would be some written communication between Ms Chynoweth and Dr Hamel about Mr Byrne's presentation that I will come to in a moment, but there was no verbal communication.

5.10. On 13 February 2012 Ms Chynoweth noted that Mr Byrne complained of right calf pain that had emerged on the Saturday morning. Mr Byrne said that he had awoken with that pain. Ms Chynoweth noted this as follows:

> '? Why.'

She also noted that Mr Byrne had not suffered any injury on the day before the emergence of this pain. Ms Chynoweth noted nothing about any possible connection with Mr Byrne's having walked several kilometres in new boots on the Thursday. Nor had she noted any other possible explanation for the right calf pain, and her notation rather suggests that there was no such explanation given and that she had no explanation at all for this pain. What was noted was that Mr Byrne expressed some concern about having a DVT and that Dr Duguid had that same day told him that he did not have one.

5.11. In her oral evidence Ms Chynoweth expanded upon Mr Byrne's presentation and told the Court that he was experiencing a lot of pain in his calf to the point that he had difficulty walking. In fact she had to provide Mr Byrne with a stick so that he could get about. She told the Court that she asked Mr Byrne what he had done that might have hurt him to this extent and he was unable to come up with any explanation. In the letter that she would write to Dr Hamel, Ms Chynoweth would indicate that there was no mention of injury or history of activity that could have injured the calf, or have injured his back from which possible calf pain may have been referred. Significantly, Ms Chynoweth said that she had an expectation that the degree of pain that Mr Byrne was experiencing would have some identifiable explanation if it involved damage to the muscle, such that she and Mr Byrne had spent some little time speaking about the possible origin of his pain[14]. He came up with nothing. This might be surprising in light of Mr Byrne possibly, in his own mind, ascribing the pain

[14] Transcript, page 88

to walking on the previous Thursday, but his apparent failure to mention it to Ms Chynoweth was probably due to a lack of conviction on his part that this was a realistic explanation. And it is apparent that Mr Byrne was entertaining some serious concern about the existence of a DVT as a possible explanation for his calf pain. This would not be surprising if he had previous history of the same and no sensible explanation for his current pain.

5.12. Ms Chynoweth examined Mr Byrne and provided some treatment. She saw Mr Byrne again on Wednesday 15 February 2012. She noted '*no change unless lies with leg elevated*'. She also noted that the pain now involved the knee and thigh. Ms Chynoweth gave consideration to the possibility that Mr Byrne was suffering from a DVT. She told the Court that what Mr Byrne was experiencing did not look like an ordinary muscle injury and she could not find a cause for such an injury. As a physiotherapist Ms Chynoweth was not permitted to order any tests that might be appropriate for DVT diagnosis such as an ultrasound or a D-Dimer test. Ms Chynoweth also told the Court that as a physiotherapist her teaching was that physiotherapeutic manipulation and the electrical modalities of therapy might dislodge a clot and for that reason physios are keen to have a clot eliminated as a possibility. With all this in mind Ms Chynoweth advised Mr Byrne to see the doctor again. She composed a letter for Mr Byrne's doctor who she believed, on this occasion, would be Dr Hamel at the Mount Compass Surgery. She gave the letter to Mr Byrne with the expectation that Mr Byrne would consult Dr Hamel and hand her the letter. The salient features in the letter were that there was no moment of injury nor history of activity which might injure Mr Byrne's calf or back, the back being a possible source of referred pain to the calf. In the letter Ms Chynoweth indicated that she found it '*extremely unusual to strain a calf without remembering an incident*'. She also indicated that it was unusual for the cramp to be present when sitting. In the letter Ms Chynoweth indicated that she was endeavouring to establish a differential diagnosis between soleus strain, a DVT and primary postelateral disc protrusion referring to the calf, the third condition involving an injury to the back. She indicated that the signs and symptoms were not clearly pointing to any one of those diagnoses, although she indicated that she thought it most likely to be the third of those, namely the disc protrusion giving rise to referred pain to the calf. Ms Chynoweth indicated in the letter that she regretted not being able to speak to Dr Hamel personally as she would not be in Mount Compass the following day. She did indicate in the letter,

however, that she believed that Dr Duguid had said that Mr Byrne's condition was not a DVT. She also indicated that there was no swelling to the leg.

5.13. Mr Byrne saw Dr Hamel on Thursday 16 February 2012. Dr Hamel told the Court that she could not recall whether she saw Ms Chynoweth's letter on the occasion of this presentation, but it is clear that she must have seen the letter at some point because on that same day she dictated a letter back to Ms Chynoweth. In any event I am satisfied that Mr Byrne handed Ms Chynoweth's letter to Dr Hamel at the time of his attendance at the surgery. This was what he had been told to do by Ms Chynoweth and it is logical to infer, which I do, that he gave it to Dr Hamel in accordance with Ms Chynoweth's instructions. I further infer that Dr Hamel read the letter at the time of her examination of Mr Byrne on this occasion.

5.14. Mr Byrne's presentation to Dr Hamel on 16 February 2012 was pivotal to the prospect of any accurate diagnosis. This would represent the final opportunity for Mr Byrne's life to be saved having regard to the fact, as I have found, that he was experiencing a DVT at the time of all of this. Although he would again see Ms Chynoweth on the subsequent occasions to which I have referred, it cannot be suggested that Ms Chynoweth had any further diagnostic responsibility in relation to Mr Byrne. Mr Byrne would not see a doctor again following his consultation with Dr Hamel.

5.15. Dr Hamel recorded in Mr Byrne's notes that the intensity of pain had not changed but had become more localised to the lateral aspect of Mr Byrne's lower leg and was still cramping, especially with standing.

5.16. Dr Hamel also gave oral evidence in the Inquest. Dr Hamel told the Court that she saw Mr Byrne on this occasion because Dr Duguid did not work on that particular day. She said that she recalled Mr Byrne walking in and limping and that her first thought was about the need to rule out a DVT. She confirmed in her evidence that she measured the circumference of the painful calf as well as the other calf and found the affected calf to be one centimetre enlarged. She told the Court:

> 'I looked for signs and symptoms of DVT and I was unable to find any that convinced me that he had it.' [15]

I am not certain whether by that answer Dr Hamel meant that she required convincing if not conclusive evidence on clinical grounds that Mr Byrne had a DVT because if

[15] Transcript, page 57

she did so require such evidence, it would be an altogether incorrect diagnostic approach insofar as clinical diagnosis could not be made of a DVT but would require further examination by way of ultrasound. As well, having regard to its potentially fatal consequences, the suspicion of a DVT, as distinct from the probability of it, ought prompt further diagnostic consideration. In any event, according to Dr Hamel, she identified localised heat and tenderness over the proximal head of the gastrocnemius muscle. This was identified just below the knee joint. Mr Byrne was also complaining of spasm in that muscle. This was the only place where Dr Hamel found anything positive in the way of signs. This indicated to her that there was some injury present. Dr Hamel said that as far as the one centimetre discrepancy was concerned, she would have expected the discrepancy to be larger in a possible DVT[16] and that a difference of one centimetre in circumference would be consistent with muscle damage[17]. I do note that this finding was different from that of Dr Duguid who had noted that the unaffected calf was if anything larger than the affected calf. At the end of her consultation Dr Hamel felt that she had ruled out a DVT[18]. She did so on the basis that there was no generalised swelling, there was no pain down the centre of the calf and what swelling there was did not accord with what one would normally expect with DVT enlargement. There was no sign that there was any venous effusion of the superficial venous system. Dr Hamel said that she was familiar with the ultrasound modality of diagnosis, but had no familiarity with a D-Dimer blood test. However, she told the Court that although in retrospect she would have liked to have performed an ultrasound, she was quite convinced that Mr Byrne's problem was muscular[19].

5.17. In cross-examination by counsel assisting, Ms Thewlis, Dr Hamel told the Court that she had misread Dr Duguid's entry of 13 February 2012, namely '*PH R DVT*' as 'no DVT', that is to say that she misread it as a record that Mr Byrne had no previous history of a DVT. She acknowledged that if she had correctly interpreted Dr Duguid's note as indicating that Mr Byrne had a history of DVT, she would have regarded that as a risk factor, would have ordered an ultrasound of the affected leg[20] and have instigated the appropriate anticoagulant treatment if the ultrasound had been

[16] Transcript, page 60
[17] Transcript, page 61
[18] Transcript, page 63
[19] Transcript, page 67
[20] Transcript, page 75

positive[21]. Dr Hamel also said the following in relation to Dr Duguid's earlier examination and clinical record:

> 'I recall that when I first started to examine him I was querying in my mind that this was probably a DVT from the - him walking in with a limp. It was therefore important for me to assess whether it was or it wasn't symptomatically and looking at signs and then I went to the notes and agreed with Dr Duguid that it wasn't and I assumed that was the case because he hadn't sent him for an ultrasound or a D-dimer.' [22]

It is interesting that when giving evidence about the significance of Dr Duguid's earlier examination, Dr Hamel stated that when she first started to examine Mr Byrne on 16 February 2012 she was querying in her mind that his pathology was '*probably a DVT*'[23]. From the above answer, however, it appears that Dr Hamel was influenced in some measure by her colleague's earlier opinion that Mr Byrne did not have a DVT.

5.18. Dr Hamel also gave evidence about Ms Chynoweth's letter. Although she had no recollection of the precise circumstances in which she came to take possession of the letter, it is clear to me that she must have had it at the time of her examination of Mr Byrne. In respect of the three differential diagnoses identified by Ms Chynoweth in her letter, Dr Hamel suggested in her letter of reply that the first possibility was the more likely, that is a soleus strain, and that Ms Chynoweth's preferred diagnosis that the pain had a spinal origin was not the most likely. When asked as to whether she would have deferred to a physiotherapist in respect of the origin of pain, she suggested that in retrospect she would have liked to have spoken on the phone to Ms Chynoweth. This in my view is a correct acknowledgement having regard to the fact that Ms Chynoweth's correspondence raised the possibility of a diagnosis that might involve fatal consequences. In questioning by me it was suggested to Dr Hamel that after seeing Mr Byrne on 16 February 2012 she really did not have any diagnosis at all in respect to the origin of his calf pain. In answer, Dr Hamel referred to her own letter in reply to Ms Chynoweth in which she stated that Mr Byrne's leg was '*puzzling*'. I took that as an acknowledgment that Dr Hamel largely agreed with the proposition that Mr Byrne left without a diagnosis. Dr Hamel's letter was dictated on 16 February 2012 and it made its way to Ms Chynoweth. In Dr Hamel's letter she said '*it appears to me to be muscular, given the heat*'. As well, she said '*as to what he had done, it remains a mystery, but I wouldn't expect heat from the area if the*

[21] Transcript, page 76
[22] Transcript, page 81
[23] Transcript, page 81

source of the problem was spinal'. In questioning by me as to whether the contents of her own letter meant that she really did not know what was causing Mr Byrne's pain, she stated that she had assumed that it was '*something muscular*'[24] and acknowledged that she really did not know.

5.19. For her part, Ms Chynoweth told the Court that once a second doctor had stated that Mr Byrne's pain was believed to emanate from a muscle injury, she thought that her concerns about a DVT must have been ill founded and so went ahead and treated it as a muscle injury for the next few consultations. There is no suggestion in my view that Ms Chynoweth's management of Mr Byrne's matter was defective.

5.20. Over the following week Mr Byrne reported to Ms Chynoweth that his calf had become quite comfortable and that he could now walk around comfortably. However, he also began to complain of pain in his foot which to Ms Chynoweth did not seem to fit in with the original calf injury. She urged Mr Byrne to discuss this with his doctor but he died before this could occur. A receptionist employed by the Mount Compass Surgery provided a statement to the Inquest. Her name is Sara[25]. The statement of Sara indicates that Mr Byrne had an appointment at the surgery that had been scheduled for the Monday or the Tuesday of the week in which he died. Mr Byrne in fact died on Monday 27 February 2012. The statement of Sara reveals that Mr Byrne rang the practice on either the Wednesday or the Friday of the preceding week to cancel the appointment, stating that he had been walking all day in town and was fine. He also indicated that if he had any problem he would go to a hospital. Mr Byrne's final appointment with Ms Chynoweth had occurred on Saturday 25 February 2012 and he had indicated at that appointment that all of his calf signs and symptoms had disappeared but that he had the swollen sensation to the right foot which Ms Chynoweth attributed to an altered gait pattern due to his calf pain over the previous two weeks.

5.21. Professor Cade, to whom I have already referred, prepared a report[26] in relation to Mr Byrne's management and gave oral evidence before the Court. Professor Cade acknowledged that he had limited and not recent experience as a general practitioner, but stated that the principles of the assessment and management of DVT is generic and cuts across specialities. He also stated that it is the subject of very well publicised

[24] Transcript, page 79
[25] Exhibit C16, 'Sara' is the only name provided on the statement
[26] Exhibit C22

guidelines and international and national documents. The suggestion was made in the course of this Inquest by counsel on behalf of a number of the general practitioners who were involved in the management of the two deceased persons that Professor Cade was viewing these matters with a certain bias that might be associated with the expertise of a medical practitioner other than a general practitioner such as, in Professor Cade's case, an intensivist or expert in haematology. I would reject that contention. The diagnosis and identification of a DVT is a matter that is intrinsic to the general practice of medicine and requires the same professional rigour as in any other medical setting.

5.22. Before dealing with Professor Cade's opinions in relation to Mr Byrne's management it is necessary to consider whether when Mr Byrne was examined at the Mount Compass Surgery on 13 and 16 February 2012, and when he saw Ms Chynoweth on various dates, he was experiencing a DVT and whether any of the signs or symptoms that he displayed in respect of his right calf were reflective of a DVT. In his report regarding Mr Byrne, Professor Cade expresses the view that when on 13 and 16 February 2012 Mr Byrne was seen with new onset right calf pain he must have had a DVT at that time because after he died two weeks later, the autopsy showed both recent and older DVT of approximately one to three weeks in age. He states that undiagnosed and therefore untreated DVT has a high risk of growing and of embolisation and that in his view clearly this was the process that was occurring during Mr Byrne's last two weeks of life. He opines that the symptoms reported on 13 and 16 February 2012 must have been immediately related to his death. In his oral evidence Professor Cade confirmed those opinions. To my mind the evidence is overwhelming that from Saturday 11 February 2012 forward, which was the day that Mr Byrne said he woke up with calf pain, he was experiencing a DVT in his lower right leg and that the calf pain that he subsequently described to two medical practitioners during the following week and to his physiotherapist for the next fortnight was symptomatic of the DVT.

5.23. In his report Professor Cade stated that it is well known that DVT cannot reliably be diagnosed or excluded on clinical examination. Professor Cade states that DVT was correctly considered by the medical practitioners as well as by the physiotherapist, but that the diagnosis was missed because objective investigation was not made. This was not said in criticism of the physiotherapist as DVT is a medical diagnosis that

requires medical investigation. Professor Cade expresses the opinion in his report that Mr Byrne's death was almost certainly preventable had a correct diagnosis been made and anticoagulant treatment instituted.

5.24. In his oral evidence Professor Cade confirmed that a possible diagnosis of DVT is not made clinically. He suggested that if there is thought of a DVT at all, which there had been in Mr Byrne's case, the only way of examining the issue is with an objective test. Professor Cade suggested that the absence of some classic clinical signs and symptoms does not necessarily mean that a DVT is not present. He said that patients who have a DVT commonly do not have those signs. This means that the absence of signs is not a reliable means by which to make a clinical diagnosis. He said:

> 'There are no clinical features that exclude a DVT, or conversely, make the diagnosis of DVT certain. The symptoms such as may occur in the leg, most prompt the suspicion of DVT. And then an objective test to see whether that in fact is correct.' [27]

He also suggested that to see a '*full hand*' of signs and symptoms, as it were, is much less common. A single sign by itself or in combination with any of them would prompt suspicion of a DVT.

5.25. Although Professor Cade acknowledged that some comfort may have been derived from the fact that in respect of virtually the same type of complaint, namely calf pain in the right leg, DVT had been excluded in November 2011, it would be unwise to conclude anything positively based upon this because Mr Byrne was presenting three months later and had been well in the intervening period. This meant that the calf pain in February 2012 should have been considered as a de novo event to be evaluated on its own new merits[28]. I took all this to mean that if, say, Mr Byrne had been experiencing continuous right calf pain since November 2011, it might be reasonable to conclude from the earlier ultrasound examination that this was not the product of a DVT. However, there is no suggestion of that in this case as Mr Byrne told Dr Duguid in the first instance that he had first experienced the pain on the Saturday morning prior to his examination of Mr Byrne on 13 February 2012.

[27] Transcript, page 241
[28] Transcript, page 243

5.26. In cross-examination Professor Cade was vigorously challenged on the question of the ability to diagnose or exclude DVT on clinical grounds alone. In answer to Mr Lindsay of counsel for Dr Duguid and Dr Hamel, Professor Cade said this:

> 'I think again as we have discussed before, unless the calf pain is associated with some clear traumatic event or unless it is bilateral, or unless there is some other clear event that makes a clinical diagnosis reasonable, then the only way of excluding a DVT if it is thought to be important, and most people think it is important, is by objecting imaging, which is quite a simple thing to do.' [29]

During the course of his evidence Professor Cade was at pains to emphasise this point repeatedly. When challenged by Mr Lindsay that calf pain by itself might not give rise to a suspicion of a DVT that is a reasonable suspicion, Professor Cade responded by saying that DVT as a possible diagnosis must remain on the list where calf pain exists in a context of no other obvious cause[30], '*otherwise calf pain has multiple causes which cannot be distinguished clinically and if DVT is on the list as it must be, it is very foolish to ignore it*'[31].

5.27. It will be remembered that to begin with Mr Byrne in his own mind appeared to assign his right calf pain to his having walked several kilometres in new boots on the Thursday. This possible explanation was not repeated either to Ms Chynoweth or to Dr Hamel. As well, there were in Ms Chynoweth's mind competing explanations for Mr Byrne's calf pain including DVT. Her preference that it was referred pain from a spinal injury differed from that of Dr Hamel who suggested it was a muscular injury within the leg itself. In all of those circumstances it is difficult to say that there was a clear explanation for Mr Byrne's calf pain. The fact that reasonable professional minds were differing on the source of the pain in itself meant that the third possibility of DVT could hardly be said to have been eliminated. And there was simply no evidence of any clear traumatic event that may have accounted for this pain. It was not as if all of the competing explanations for Mr Byrne's calf pain were benign. One possible explanation was a DVT and one does not have to view the matter with unerring hindsight to suggest that this was a differential diagnosis that remained as one that was very much on the table and, having regard to the lack of any other sensible explanation, needed to be excluded not on clinical grounds but by way of ultrasound, or at least a D-Dimer test in the first instance. Professor Cade illustrated

[29] Transcript, page 273
[30] Transcript, page 293
[31] Transcript, pages 293-294

his point by reference to Dr Duguid's note that Mr Byrne had reported to him no trauma and no pinging in the calf such that if the patient had reported 'feeling a calf muscle go' that is a circumstance where a doctor might be satisfied that calf pain has a benign explanation. Professor Cade also rejected the suggestion that an inability to exclude DVT on clinical grounds alone in the general practitioner's surgery would place an unduly high standard of care upon a general practitioner. To this Professor Cade said:

> 'The problem with ignoring that possibility is that a number of patients will be lost.' [32]

One would also make the observation here that when a DVT is experienced by a person in the community as opposed to in a hospital, the general practitioner is to a large extent both the first and last line of defence against misdiagnosis and its possible fatal consequences. As Professor Cade suggested:

> 'Well, I think general practice in Australia has extremely high standards and it is not just the poor cousin of hospital medicine. Skilled general practitioners have no difficulty with diagnosing a DVT, and we see this all the time.' [33]

5.28. As to the Wells criteria, Professor Cade agreed with Mr Lindsay of counsel that it is a document that has been derived from hospital experience and has greater application in assisting risk stratification and therefore assessment in hospital patients.

5.29. I accept the evidence and opinions of Professor Cade in relation to Mr Byrne and in particular in respect of the proper diagnostic approach when a DVT is a possible diagnosis.

6. Conclusions relating to the death of Mr Byrne

6.1. When Mr Byrne presented to Dr Duguid on 13 February 2012 he was experiencing a DVT in his right calf. The calf pain of which he complained was symptomatic of that DVT.

6.2. Dr Duguid rightly considered DVT as a possible diagnosis but in the event formed an erroneous belief that the pain was due to calf muscle strain. In coming to that belief Dr Duguid did not perform any test or order any test in relation to Mr Byrne to eliminate a possible diagnosis of DVT.

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[32] Transcript, page 277
[33] Transcript, page 279

6.3. When Mr Byrne consulted with Dr Duguid on 13 February 2012 he told Dr Duguid that he had a previous history of a DVT in his right leg. I accept Dr Duguid's evidence that this is what Mr Byrne told him. Mr Byrne provided sufficient detail to Dr Duguid about the history of a previous DVT and about its subsequent treatment to lead the Court to find that Mr Byrne was accurately describing a previous history of a DVT, notwithstanding the fact that there is no documented evidence of the same of which the Court is aware.

6.4. This previous history of DVT in the Court's view, together with Mr Byrne's symptoms as described by him and the fact that there was no convincing explanation offered to Dr Duguid as to the origin of Mr Byrne's calf pain, should have caused Dr Duguid to order a diagnostic ultrasound of Mr Byrne's leg. The Court finds that Mr Byrne's diagnosis should not have been made on clinical grounds alone, nor should the exclusion of a DVT have been made on clinical grounds alone. It is possible, however, that Dr Byrne may have been misled to an extent by a literal application of the DVT Probability: Wells Score System.

6.5. I find that if Mr Byrne had undergone an ultrasound examination of his leg, DVT would have been diagnosed and this would have instigated a course of anticoagulant treatment. Mr Byrne's death could have been prevented if the DVT had been diagnosed at this point.

6.6. Mr Byrne saw the physiotherapist, Ms Chynoweth, later during the afternoon of 13 February 2012. Ms Chynoweth formed the conclusion that Mr Byrne's signs and symptoms did not point clearly to any particular diagnosis. Ms Chynoweth formed a three-way differential diagnosis that included the possibility of DVT. Ms Chynoweth rightly conveyed her uncertainty about the source of Mr Byrne's calf pain by way of letter to Dr Judith Hamel dated 15 February 2012. In that letter Ms Chynoweth appropriately pointed out that there was no moment of injury and no history of activity which might have injured Mr Byrne's calf or back from which calf pain may have been referred.

6.7. Dr Judith Hamel saw Mr Byrne on 16 February 2012. When she saw Mr Byrne she was in possession of Ms Chynoweth's letter. I find that on this occasion Dr Hamel did not understand that Mr Byrne had a stated previous history of DVT due to the fact that she misread Dr Duguid's shorthand note to that effect. I find that if Dr Hamel

had correctly interpreted or read Dr Duguid's note concerning Mr Byrne's previous history, she would have ordered an ultrasound of Mr Byrne's right calf.

6.8. Regardless of whether Dr Hamel failed to understand Mr Byrne's previous history of DVT, the Court has concluded that at the time Mr Byrne consulted Dr Hamel there was no history of trauma or other activity that could have explained any of Mr Byrne's symptoms, either by way of injury to the calf or to his back from which pain may have been referred. There was in existence three possible differential diagnoses available to Dr Hamel that included DVT. Dr Hamel excluded the presence of a DVT on clinical grounds alone, despite the fact that there was no explanation for Mr Byrne's calf pain, and despite the fact that there was no clear alternate diagnosis to DVT. I find that Dr Hamel should have given more careful consideration to the possibility of DVT regardless of any previous history that Mr Byrne had in that regard. Accordingly, Dr Hamel should have ordered an ultrasound of Mr Byrne's calf purely on the basis of his unexplained symptomatology alone. It was not appropriate for Dr Hamel to exclude such a diagnosis on clinical grounds.

6.9. If Dr Hamel had ordered a diagnostic ultrasound on or about 16 February 2012 it would have revealed the presence of the DVT and anticoagulant therapy would then have been instigated. Mr Byrne's death could thereby have been prevented.

6.10. Following Mr Byrne's consultation with Dr Hamel he continued to see and be treated by Ms Chynoweth, the physiotherapist. I find that Ms Chynoweth was reassured by Dr Hamel's letter that Mr Byrne did not have a DVT and so she continued to treat him on that basis. No criticism is to be made of Ms Chynoweth in that regard.

7. <u>The death of Mrs Jacqueline Weaver</u>

7.1. According to the statement of Mrs Weaver's daughter, Melanie, Mrs Weaver was a seasoned international traveller who travelled once a year on average and generally went overseas for periods between one to four weeks. The last travel period had occurred in June and July of 2012. Her partner, Mr Donald Bills, had travelled with her. According to the travel itinerary, the holiday had taken place between 11 June and 12 July 2012, on which day she and Mr Bills returned to Adelaide. There had been nothing unusual about Mrs Weaver's health during that trip except that both she and Mr Bills had experienced some diarrhoea. The places that they travelled to included France and Dubai. The return trip had involved a flight in economy class

from Paris to Dubai of approximately 6 hours duration with a 2 to 4 hour layover in Dubai followed by a further flight in economy class from Dubai to Melbourne of about 15 hours duration. There was some delay in Melbourne in respect of their connecting flight but in the morning they flew from Melbourne to Adelaide. The legs from Paris to Dubai and Dubai to Melbourne were full. Mr Bills who gave oral evidence told the Court that they occupied an aisle seat and the seat next to it. Mr Bills and Mrs Weaver changed seats from time to time and also Mrs Weaver would occasionally walk around the plane, but less frequently than Mr Bills. Mr Bills told the Court that Mrs Weaver did not complain of any discomfort after that journey.

7.2. The long duration of the flights at least constituted a risk factor for the development of DVT, as is well known.

7.3. Mrs Weaver had also been placed on hormone replacement therapy, taking a product which, according to the evidence, might also constitute a risk factor in respect of development of DVT. The evidence was that Mrs Weaver did not obtain this on prescription but had obtained it by way of samples from a general medical practice at which she used to work, namely that of Dr Donald Angus. It was this practice at which, about a month after her overseas trip, she would complain of calf pain and other symptoms. When police inspected Mrs Weaver's unit after her death they found a number of boxes of the HRT product, both full and empty. It is not known for certain whether Mrs Weaver was habitually taking these tablets at the time of her death. If she had been consuming them recently, it would have constituted another risk factor for the development of DVT in her case.

7.4. I have already referred to the forensic pathologist Dr Langlois' findings in relation to the age of the pulmonary thromboembolus and the anatomical origin of that pathology. Specifically, Dr Langlois gave evidence that the oldest thromboemboli could have been some months in age. In the context of Mrs Weaver's recent air travel Dr Langlois expanded as follows:

> 'Well, certainly the oldest thromboemboli could date back to her initial presentation in August and thromboemboli by air flight is recognised to occur. Apparently, the peak period to get symptoms is about two weeks after travel, but it can be variable, and certainly, given the recognition that pulmonary thromboembolus - well, certainly deep vein thrombosis, pulmonary thromboembolus is associated with long air flights. It would certainly seem a very reasonable conclusion that either the flight out or the flight in - the flight out from Australia or the flight back to Australia, the immobility associated

> with that, allowed the formation of a thrombus in the calf and then that later presented in August with her symptoms of calf pain and palpitations. That could have easily been an earlier event of thromboembolus. So the clot would sit there in the leg and grow, throw off a thromboembolus, give her the symptoms in the chest, but because it is not treated, the clot is still there in the leg and it just starts growing again and then throws off another one, and this keeps happening until the eventual fatal event. Obviously, in retrospect, one can't prove that, but nonetheless, in my opinion, that scenario does fit with the events in this case of a long air flight, a couple of earlier presentations, my findings at post-mortem examination and her final death.' [34]

The presentations in August that Dr Langlois was referring to in that passage occurred on 13 and 22 August 2012.

7.5. Both of the presentations to a general practitioner occurred in circumstances where Mrs Weaver had not displayed any recent sign of being overtly unwell either to her partner, Mr Bills, or to her daughter Melanie Weaver. However, Ms Weaver suggested that her mother occasionally had shortness of breath but had appeared to be fine during their walk the day before her death. Mrs Weaver's son, Mr Scott Weaver, who provided a statement to the Inquest[35] provided a little more detail about his mother's recent state of health. In his statement he suggested that about six to eight weeks prior to her death his mother had said to her family that she was not feeling one hundred percent and was not sure why. She said that she had shortness of breath and had felt tired. She said on this occasion that she was intending to undergo some blood tests. The test resulted in his mother revealing that she had diabetes and nothing else. There is no evidence that Mrs Weaver complained of chest pain, heart palpitations or pain in either of her calves. As far as Mrs Weaver's frame of mind is concerned, in his evidence Mr Bills told the Court that following Mrs Weaver's former husband's death, she had been concerned about the sale of the house. Mr Bills said that this appeared to play on her mind. This was before their mid 2012 trip. However, following that trip Mr Bills believed that Mrs Weaver's frame of mind was excellent and that her financial situation was very good as evidenced by her ability to pay her own way in relation to the overseas trip that had taken place as well as the trip that they were planning to take in the relatively near future. Mrs Weaver's daughter Melanie states that although her mother had experienced issues with the manner of her father's death earlier that year, in recent times her mother seemed fine. Mrs Weaver's son, Scott Weaver, states that his mother had been under a lot of stress

[34] Transcript, pages 123-124
[35] Exhibit C6a

since his father's death, but had been '*pretty good*' in the last month and that in the past few weeks his mother seemed a lot more relaxed.

7.6. It is against that background that the attendances at the general practitioner come to be considered.

7.7. Mrs Weaver consulted Dr Donald Angus at a practice on Grange Road, Flinders Park on Monday 13 August 2012, Thursday 16 August 2012, Wednesday 22 August 2012 and Thursday 23 August 2012. Dr Angus gave evidence in the Inquest.

7.8. Dr Angus told the Court that he has practised as a general practitioner since 1972. He has practised both overseas and in South Australia. He has been practising at the Flinders Park practice as a sole general practitioner since 1978. At one time Mrs Weaver worked as a receptionist at that practice. This occurred between March 2006 and September 2010. Thereafter Mrs Weaver had worked at another medical practice. Dr Angus told the Court that he became friendly with Mrs Weaver especially when she started seeing Mr Bills who was a patient of Dr Angus as well as a friend. Dr Angus told the Court that he knew something of Mrs Weaver's and Mr Bills' overseas travel together, but only in respect of plans that they had to travel together sometime in the future, which was accurate insofar as they did have plans, but he told the Court that he did not have any recollection of knowing that they had travelled together in the middle of 2012.

7.9. Dr Angus told the Court that as a general practitioner he was familiar with DVT. He told the Court that in the previous 20 years he had encountered 38 patients whom he had diagnosed with DVT. In addition, he had patients who had been diagnosed with pulmonary embolism, numbering about 8 or 10.

7.10. Before dealing with Dr Angus' consultations with Mrs Weaver in August 2012, I should mention something of a consultation that he had with her partner Mr Bills on 12 July 2012 which was the day that Mr Bills and Mrs Weaver returned from their month long overseas holiday in Europe. That day Mr Bills consulted Dr Angus in relation to the diarrhoea that he had experienced while overseas. This issue is relevant to the question whether, when Mrs Weaver consulted Dr Angus approximately one month later in August 2012 with her symptoms consistent with DVT and a possible pulmonary embolus, Dr Angus knew of the significant risk factor of her recent overseas long haul travel. In his evidence Dr Angus denied that he knew

anything about that. There seems little doubt that during Mr Bills' consultation with Dr Angus he would have mentioned the fact that he, at least, had been overseas because it was in that very context that he saw Dr Angus about diarrhoea, and in particular diarrhoea that he had experienced during that holiday.

7.11. In his evidence before the Court Mr Bills on a number of occasions was adamant that during this consultation he had not told Dr Angus that Mrs Weaver had accompanied him on the holiday, saying that it had been none of his business. Mr Bills said differing things about whether Dr Angus may have known about his relationship with Mrs Weaver saying at one point that, to his knowledge, Dr Angus did not know about his relationship with Mrs Weaver and at another saying that he assumed that he knew that he was seeing Mrs Weaver. Regardless, it is evident from Dr Angus' own evidence that he knew of their relationship and at least of their plans to travel in the future. I do not know why or how Dr Angus would know of those future plans and not know of previous travel. With some hesitation I have concluded that Dr Angus may not have had an appreciation of the fact that Mrs Weaver had recently travelled when she consulted him in August 2012, or that if he did know about that it was in his mind when Mrs Weaver came to see him in August.

7.12. When Mrs Weaver saw Dr Angus on Monday 13 August 2012 he made notes in the computerised clinical record. Dr Angus appears to have conducted a thorough examination that included a full blood examination and an ECG. Dr Angus noted Mrs Weaver's complaint as follows:

> 'Complaining of Left calf pain
> stressed, Complaining of chest pains and palpitations
> …
> R**eason for contact:**
> Left Calf pain' [36]

There is no mention within the note for this attendance of the possibility of DVT or pulmonary embolus. There does not appear to be any provision within the computerised proforma for the recording of a diagnosis. There is no notation as to what Mrs Weaver's stressors were, if divulged by Mrs Weaver, that has led to Dr Angus noting that as part of her presentation Mrs Weaver was stressed. In his oral evidence before the Court Dr Angus stated that Mrs Weaver also had a cough as part of her presentation, but that he believed that her sore leg, her complaints of chest pain

[36] Exhibit C14, page

palpitations and cough were something of an aside or even an excuse to come and see him about a more significant presentation of being '*very stressed*' following her husband's suicide earlier in the year and from financial difficulties. To Dr Angus the stress was the main reason for her coming to see him. When asked by his counsel, Mr Lindsay, whether there was any reason why Dr Angus did not record the detail of what her stressors were, he told the Court that Mrs Weaver did not want him to record that detail. Notwithstanding this it is clear that Dr Angus recorded the reason for contact as being left calf pain and noted this as the first aspect of her overall complaint. In any event Dr Angus told the Court that he examined Mrs Weaver's calf and found no abnormality. However, he provided Mrs Weaver with a sample of Mobic which is for muscular pain. Regardless of whether or not Mrs Weaver's principal complaint was stress related, there does not appear to have been any proper basis for Dr Angus to have questioned the legitimacy of Mrs Weaver's complaint of calf pain as being a device in order to see him. In the event Dr Angus acknowledged that he diagnosed Mrs Weaver's calf pain as a strain. He said that he had told her that he thought she had just a strained muscle, and that was why he was giving her Mobic. Dr Angus told the Court that he asked Mrs Weaver whether she had strained her leg or fallen, or experienced any trauma and she had said no, thus meaning that the pain had no explanation. He advised Mrs Weaver to apply local heat and rubbing to the affected area. Mrs Weaver would see Dr Angus again over the next ten days. Dr Angus told the Court that on at least some of these occasions he enquired of Mrs Weaver about her leg symptoms to which she said she was fine in that regard. Thus it seems plain enough that Dr Angus gave some credence to Mrs Weaver's complaints of left calf pain. When asked point blank as to whether he believed that Mrs Weaver had pain in the calf he said:

> 'I could find no objective signs of it so I didn't really believe it was anything terribly much.' [37]

Dr Angus did say that he believed Mrs Weaver's assertions of chest pain and palpitations[38], but that it occurred to him that she was mentioning stress as an explanation in her own mind for those chest pains and palpitations[39]. An available interpretation of Mrs Weaver's presentation is that Mrs Weaver was genuinely experiencing physical symptoms that included calf pain, chest pain and palpitations,

[37] Transcript, page 189
[38] Transcript, page 189
[39] Transcript, page 190

but that in her own mind she wanted to attribute chest pains and palpitations to a relatively benign origin such as stress. But such an interpretation could hardly detract from the weight to be accorded to her complaints of calf pain. Dr Angus performed some examinations that are attributable to chest pains and palpitations, namely an ECG. He also ordered blood tests including a full blood examination and a liver function test including for electrolytes, urea and creatinine.

7.13. In the event the ECG proved to be normal but blood tests revealed that Mrs Weaver was diabetic. I accept the evidence of Professor Cade that a normal ECG would not exclude a pulmonary embolus.

7.14. Dr Angus told the Court that he did not believe that Mrs Weaver had a DVT when he saw her either on 13 August 2012 or at any subsequent occasion when he had contact with her over the next ten days. In fact he told the Court that he still does not believe that she had a DVT when he saw her. The truth of the matter was, as Dr Angus would acknowledge in his evidence, that the thought of a DVT as a possible source of calf pain was a matter that never occurred to him at all. It was simply not a differential diagnosis that was on the table or considered by him at the time. It was a diagnosis that did not cross his mind.

7.15. In his report concerning Mrs Weaver[40], Professor Cade expresses the view that there had been one or more previous non-fatal episodes of thromboembolism prior to the acute episode that caused her death. The old pulmonary infarction in the right lower lobe of the lung and the more recent infarction in the right upper lobe were findings consistent with a process of untreated and thus progressive venous thromboembolism over several weeks. Professor Cade suggests that there were '*obvious clues*' to the development of venous thromboembolism that were available at the time of Mrs Weaver's presentations in August 2012. In his oral evidence before the Court Professor Cade suggested that Mrs Weaver did have a DVT at the time of her presentation on 13 August 2012[41]. The fact that the long haul travel had occurred as much as a month prior to her presentation and that the complaint of calf pain had arisen only recently would not exclude a connection between that pain and the long haul travel. Professor Cade said that the onset of the symptoms was within the timeframe during which a DVT can occur. As well, DVTs may be silent in the first

[40] Exhibit C23
[41] Transcript, page 245

few weeks after a precipitating event such as a long haul flight. In addition, the combination of chest pain and palpitations with calf pain raises the possibility not just of a DVT but it raises the potential that the DVT has already started to embolise to the lungs. In his evidence he stated that chest pain and palpitations may be reflective of a pulmonary embolism. Professor Cade gave the following answers:

> 'A. Yes, that's correct. That is my interpretation of the information. Looking back at it, at what must have been happening, that not necessarily the interpretation that somebody might have at the time, but it inevitably has to be the correct interpretation looking back at it.
>
> Q. Is that because chest pain and palpitations can be symptomatic of a pulmonary embolus.
>
> A. They certainly can, and we know from the pathological diagnosis exactly what was happening and when, so I was trying to connect them.' [42]

7.16. In the opinion of the Court when Mrs Weaver presented to Dr Angus on 13 August 2012 she was experiencing a DVT and that the left calf pain of which she complained was a symptom of that DVT. The evidence in my view demonstrates that when Mrs Weaver presented to Dr Angus on 13 August 2012 and subsequently, she was suffering from a DVT as well as a non-fatal pulmonary embolus. To my mind such a conclusion is available from the fact that her symptoms were consistent with DVT and pulmonary embolus, from the fact that there was no overt alternate explanation for her symtomatology when examined in the round and from the fact that the evidence at autopsy supports the existence of pulmonary embolus at that point in time. I also think it more probable than not that it was all of this symptomatology combined that prompted Mrs Weaver to consult Dr Angus in the first place and that although she endeavoured to assign chest pain and palpitations to possible stress, it is highly unlikely that she used calf pain as an excuse to see Dr Angus. There is nothing in Dr Angus' clinical note to support the suggestion that the complaint of left calf pain was a mere aside or excuse.

7.17. In his report and in his evidence Professor Cade suggests that new onset calf pain without preceding trauma should always prompt consideration of a DVT as an important one of the possible diagnoses. In his opinion there should have been consideration of a diagnosis of DVT on 13 August 2012. Professor Cade stated that it was unfortunate that the obvious clues to developing venous thromboembolism were

[42] Transcript, page 285

overlooked in this case and that the relevant symptoms were attributed to other causes. He does acknowledge that the index of suspicion can be lower in ambulant patients such as Mrs Weaver as distinct from hospitalised patients unless known risk factors happen to be present. There was one possible known risk factor to Dr Angus and that was the hormone replacement therapy, but I am not certain that this would necessarily have entered his mind having regard to what was a loose association between Mrs Weaver and his practice. There is also no convincing evidence that Mrs Weaver was still taking the HRT tablets at that time. What is concerning is that it did not even occur to Dr Angus that Mrs Weaver's calf pain was symptomatic of a DVT when one had to accept that the calf pain was real and that no meaningful enquiry was made as to its possible origin. The calf pain was quite unexplained to Dr Angus except by reference to the dubious notion that it was an excuse to see him.

7.18. Professor Cade addressed the question of the additional symptoms of chest pain and palpitations and agreed that the acuteness of a diagnosis of DVT would be even more important in such a context. He said:

> 'Yes, I think it would. I think the combination of chest pain and palpitations with calf pain raises the possibility not just of DVT but that the potential DVT has already started to embolise to the lungs and this is - the reason that a DVT is potentially fatal is via embolism, and it would suggest that this potentially fatal pathway is already in progress. Chest pain and palpitations obviously come from the lungs, come from the chest, but more importantly, a week later the shortness of breath is a much more important sign and chest pain and palpitations, but that's part and parcel of the same principle.' [43]

I will come to the question of shortness of breath in a moment, which was a new symptom that Mrs Weaver would complain of days later, but the point that Professor Cade made is that as a principle of medical diagnosis, one should view a presentation holistically and to seek a unifying diagnosis where at all possible. The added red flag to Professor Cade was the recent long haul flights approximately one month before Mrs Weaver's initial presentation which provided a risk factor about which an enquiry should have been made. Professor Cade suggested that enquiries should be made about possible risk factors[44] when there is a suspicion of DVT. In this case the long haul flight would have been a red flag to suspect DVT. An enquiry could also have included a question as to the duration of Mrs Weaver's symptoms.

[43] Transcript, pages 248-249
[44] Transcript, page 246

7.19. It seems odd to the Court that it did not occur to Dr Angus that DVT was a possible source of calf pain even without him knowing about Mrs Weaver's recent long haul travel. One would have thought that given the unexplained nature of the calf pain, the possibility of a DVT as the cause of the pain should have at least crossed his mind and have prompted the appropriate enquiries as to the existence of risk factors in her case. If DVT had occurred to Dr Angus as the possible source of the pain, it would seem an inevitable and logical enquiry to have made of a patient such as Mrs Weaver whether she had undertaken any recent long haul flights. The answer would inevitably have been that she had experienced such a flight. Dr Angus told the Court that if he had known that Mrs Weaver had travelled, he would have appreciated that it was a risk factor for DVT, but said that even then he would have expected it to have appeared during the course of the travel and not months later. The answer to that is that the DVT may have been precipitated by her return travel in mid July which was only approximately four weeks before Dr Angus saw Mrs Weaver. According to Professor Cade, whose evidence I accept, Mrs Weaver would not necessarily have been immediately experiencing symptoms of DVT even if that return travel had been its precipitating factor.

7.20. In his evidence Dr Angus stated that he did not regard the fact that DVT did not enter his consideration as a shortcoming in his management of Mrs Weaver. He did acknowledge, however, that if he had known of the detail of her travel he probably would have undertaken further investigations and in particular would have considered a diagnosis of DVT, thus prompting his ordering of an ultrasound scan. If a clot had been present he would have undertaken the necessary further diagnostic activity[45].

7.21. Unfortunately Dr Angus in his evidence does seem to embrace the idea that a DVT cannot be clinically excluded simply by physical examination.

7.22. Dr Angus also had contact with Mrs Weaver on 14 and 16 August 2012 which was, as I understand it, contact regarding the results of her blood examinations and an arrangement for a full glucose tolerance test. Dr Angus told the Court that he made no enquiry of Mrs Weaver other than to ask her whether she was alright and she said that she was[46].

[45] Transcript, page 198
[46] Transcript, page 165

7.23. The next occasion when Dr Angus saw Mrs Weaver in the surgery was Wednesday 22 August 2012. It was on this occasion that the results of blood glucose tests were discussed and that confirmation of a diagnosis of diabetes together with a diabetic care plan was also dealt with. On this occasion Mrs Weaver also complained of a cough and shortness of breath for which Dr Angus gave her a sample of Symbicort. Dr Angus also prescribed prednisolone tablets. Dr Angus told the Court that he was not considering pulmonary embolism either on 13 August or 22 August 2012 when Mrs Weaver came in with a history of shortness of breath and a cough. In Professor Cade's view a diagnosis of signs and symptoms consistent with asthma on the occasion of 22 August 2012 was unusual insofar as the condition had never been recorded in Mrs Weaver before. As well, the fact of calf pain previously, whether resolved or not at that time in somebody who then develops shortness of breath, is a duality of circumstances that should raise a flag. Professor Cade suggested that shortness of breath was a much more important sign than chest pain and palpitations as far as pulmonary thromboembolus is concerned[47]. He regarded this symptom as the '*key thing*'[48]. In essence it was a double red flag for venous thrombosis and pulmonary embolism. The absence of calf pain at that point in time was by that stage a neutral finding. On the one hand it could be reassuring in the sense that the calf is better, but on the other hand it could be totally ominous because it might be the result of the blood clot having gone into the lungs. When asked as to whether on 22 August 2012 there was any significance in the fact that there was no complaint of chest pain or palpitations at that point, Professor Cade said this:

> 'By far the most prominent feature of pulmonary embolism is in fact shortness of breath rather than chest pain. Chest pain can occur, palpitations can occur, but the dominant feature is shortness of breath, so that's a much more serious chest symptoms than the other two. The fact that it is changing between symptoms is immaterial. They're all chest symptoms, they all indicate something's happening in the chest, and the symptoms on the 22nd were worse than the symptoms on the 13th.' [49]

7.24. As far as the last presentation of 23 August 2012 is concerned, Dr Angus has not recorded any information about Mrs Weaver's earlier symptoms. Nor had he done so in relation to his attendance on her on 22 August 2012. However, on 23 August 2012 Dr Angus said that he asked Mrs Weaver about her breathing and how her foot was

[47] Transcript, page 249
[48] Transcript, page 250
[49] Transcript, page 253

and she said they were both fine. An arrangement was made for Mrs Weaver to return to the practice in a month's time for a follow-up of her diabetes care plan.

7.25. In the weeks between 23 August 2012, when Mrs Weaver was last seen by Dr Angus, and 23 October 2012, the day that she died, there is no evidence that Mrs Weaver consulted any other health care practitioner. As seen earlier there is no evidence from those who were close to Mrs Weaver that during that period Mrs Weaver complained of any pain or other signs or symptoms of DVT or pulmonary embolus. However, I have no doubt that during that period Mrs Weaver was at risk of a fatal pulmonary embolus by reason of a DVT that was still in existence.

7.26. In his report regarding Mrs Weaver Professor Cade suggested that if the correct diagnosis had been made when she presented to Dr Angus in August, anticoagulant treatment would have been prescribed following the confirmation of the thromboembolism. As seen earlier in the case of Mr Byrne, death from this condition is very unlikely once appropriate anticoagulation has commenced. In Professor Cade's opinion Mrs Weaver's death was almost certainly preventable.

8. Conclusions relating to the death of Mrs Weaver

8.1. When Mrs Weaver presented to Dr Angus on 13 August 2012 she was experiencing a DVT in her left calf. The calf pain of which she complained was symptomatic of that DVT.

8.2. Mrs Weaver's complaint of chest pain and palpitations at the presentation on 13 August 2012 were symptoms of pulmonary embolus that she was experiencing at that time. I do not believe that Mrs Weaver used her calf pain as an excuse to see Dr Angus in relation to stress she may have been experiencing at the time, but it is possible that in her own mind she ascribed her symptoms of chest pain and palpitations to stress.

8.3. I think it is more probable than not that Mrs Weaver's DVT had been precipitated by the long duration of air travel that she had undergone in mid July of 2012. However, for the purposes of these findings it is not necessary for any such conclusion to be drawn. The air travel of itself presented as a significant risk factor for the development of a DVT and should have been viewed as such when her symptoms in August 2012 came to be evaluated.

8.4. I accept Dr Angus's evidence and find that when he examined Mrs Weaver on 13 August 2012 the thought that she might be experiencing a DVT in her left calf or that she was experiencing a pulmonary embolus did not cross his mind. I also find that there was no overt explanation for Mrs Weaver's calf pain. She described no trauma or other circumstance that may have explained it. In these circumstances it was incumbent upon Dr Angus at least to consider the possibility that Mrs Weaver was experiencing a DVT. If he had so considered it he would, consistent with his professional responsibility, have enquired of Mrs Weaver as to whether any risk factors for DVT existed in her case. Such an enquiry would have included whether or not she had recently undergone any long haul air travel. With some hesitation, having regard to the evidence of Mrs Weaver's partner Mr Donald Bills, I have accepted Dr Angus' evidence that he did not have any appreciation of the fact that Mrs Weaver had recently undergone long haul air travel. However, the fact that she had undergone such travel in July 2012 could easily have been elicited from Mrs Weaver if Dr Angus had considered the possibility that Mrs Weaver was experiencing a DVT as he should have.

8.5. If Dr Angus had established that Mrs Weaver had recently undertaken long haul air travel, in my view he would inevitably have considered DVT as a part of a differential diagnosis and, in accordance with his own evidence before the Court, would have ordered an ultrasound of her leg. The ultrasound would have established that Mrs Weaver was experiencing a DVT in her left leg.

8.6. Mrs Weaver consulted Dr Angus on a number of occasions in the days following 13 August 2012. In particular she consulted him on Wednesday 22 August 2012. On this occasion she complained of a cough and shortness of breath. I accept Dr Angus' evidence that Mrs Weaver said that her leg was fine. I also accept his evidence that it did not occur to him on this occasion that Mrs Weaver might be experiencing a DVT or a pulmonary embolus. However, I find that Mrs Weaver's shortness of breath was another symptom of pulmonary embolus that she was experiencing.

8.7. The Court finds that between 13 August and 22 August 2012 inclusive, there was sufficient information available to Dr Angus for him to have at least considered the possibility that Mrs Weaver was experiencing a DVT and that in all of the circumstances an ultrasound of her leg should have been ordered.

8.8. If Dr Angus had ordered a diagnostic ultrasound between 13 August 2012 and 23 August 2012 when he last saw her, it would have revealed the presence of the DVT. As well, the presence of the DVT would have given rise to a high degree of suspicion that she was also experiencing pulmonary thromboembolism which would then probably have also been diagnosed. In those circumstances the appropriate treatment and therapy would have been instigated and Mrs Weaver's death could thereby have been prevented.

9. Recommendations

9.1. Pursuant to Section 25(2) of the Coroners Act 2003 the Court is empowered to make recommendations that in the opinion of the Court might prevent, or reduce the likelihood of, a recurrence of an event similar to the event that was the subject of the Inquest.

9.2. It will be seen that none of the first eight criteria within the DVT Probability: Wells Score System were fulfilled in Mr Byrne's case or in Mrs Weaver's case notwithstanding the fact that they both had DVT. There are two criteria within this document that are worthy of comment. The second criterion involving recent confinement to bed or recent major surgery might suggest that these are the only risk factors that are relevant or which need to be enquired about. This is not the case as recent long haul air travel is not only a known cause of DVT, but is a risk factor when the presence of DVT in a patient comes to be clinically evaluated. Previous history of DVT is another risk factor, yet this version of the Wells criteria does not make reference to it. The document does not prompt the clinician to consider whether in addition to symptoms that would normally be associated with DVT such as calf pain there are any signs or symptoms of pulmonary thromboembolus such as chest pain, palpitations or shortness of breath. The ninth criterion suggests that an alternative diagnosis more likely than DVT will immediately deduct two points from the score. One has to pose the question as to how an alternative diagnosis can be considered to be more likely than a DVT when a patient presents with symptoms consistent with DVT but where there is no sensible explanation for those symptoms such as recent trauma to the leg. It will be seen that in each of the two cases at bar it could not be said with any degree of conviction that an alternative diagnosis was more likely than a DVT. For a start, in neither case was there a convincing benign explanation for the calf pain, or at least one that was apparent to any of the medical practitioners who saw either Mr Byrne or Mrs Weaver. And yet, as the Court has found, Mr Byrne and

Mrs Weaver must have had DVT when they were seen by their respective general practitioners. This case demonstrates that there is, perhaps, a limit to the reliance that can be placed on the Wells Score System by the general practitioner in the community, or at least upon the version of it that was tendered to the Court. The use of this particular document in other than hospital settings may require re-evaluation in the light of these two cases. Any version of the Wells Score System should in the opinion of the Court certainly make reference to the risk factor of recent long haul air travel and previous history of DVT. In any event any consideration of whether a DVT exists in a patient should automatically cause the practitioner to ask the patient whether any such travel has occurred in that patient's recent activity. It would also follow that where there is no differential diagnosis that might have an identified cause, it really cannot be said with any degree of confidence that an alternative diagnosis more likely than DVT is available.

9.3. I have accepted the opinion of Professor Cade that the same professional rigour needs to be brought to bear by the diagnosing general practitioner in the community as that which is delivered within a hospital setting. I have also accepted Professor Cade's evidence that general practitioners should not exclude a diagnosis of DVT on clinical grounds alone. If anything, the need for a very high level of diagnostic rigour involved in diagnosing DVT or pulmonary embolus in the community is even greater, owing to the fact that the general practitioner is very much the first and last line of defence against the fatal consequences of the condition. The risk in excluding DVT on clinical grounds alone in respect of a patient in the community is that, as was the case here, the patient will be reassured and then probably do nothing more about it with the consequence that further evaluation and necessary preventative medical treatment and will not be provided. The Court was satisfied by the evidence of Professor Cade that calf pain in the context of no obvious cause must mean that DVT should remain on the list of possible causes and prompt further investigation. Mr Lindsay on behalf of the general practitioners involved in these cases drew the Court's attention to the requirements and guidelines in relation to diagnostic imaging that are contained within the Medicare Benefits Schedule Book "DIB". The contention is that general practitioners in particular are mandated to exercise caution in ordering what may turn out to be superfluous diagnostic imaging lest they fall foul of the sanctions that may be imposed pursuant to the activities of the Professional Services review Committee under section 95 of the Health Insurance Act 1973. If this was an element in either of these cases then all that can be said is that such caution

was misplaced. The cautious, and necessary, approach in each of these cases would have been to order the ultrasound imaging. It would have prevented these deaths.

9.4. The Court makes the following recommendations that are drawn to the attention of the Chief Executive Officer of the Royal Australian College of General Practitioners, the President of the South Australian Branch of the Australian Medical Association and the Chair of the Physiotherapy Board of Australia. They should also be drawn to the attention of professional bodies of chiropractors, osteopaths and other like health care practitioners:

1) That these findings and recommendations be drawn to the attention of all general practitioners, physiotherapists and other like health care practitioners;

2) That advice and education be delivered to all general practitioners, physiotherapists and other like health care practitioners concerning the signs and symptoms of DVT and pulmonary embolus with advice that DVT within the leg of a patient may not exhibit all of the classic signs and symptoms at the same time;

3) That general practitioners be advised and counselled not to place undue reliance on the DVT Probability: Wells Score System in attempting to diagnose or exclude DVT or pulmonary embolus, particularly having regard to the fact that the version of the Wells Score System that was tendered to this Court mentions nothing about highly relevant matters such as recent long haul air travel as a risk factor for the development of DVT, mentions nothing about previous history of DVT as a risk factor and says nothing about the need to be satisfied that there is an explanation for signs and symptoms before DVT can be excluded on clinical grounds. In addition, the Wells Score System insofar as it relates to DVT probability does not include reference to signs and symptoms that are consistent with DVT already having given rise to a pulmonary thromboembolus such as chest pain, palpitations and shortness of breath;

4) That the Chief Executive Officer of the Royal Australian College of General Practitioners cause guidelines to be developed, for the specific benefit of general practitioners, in relation to diagnosis of DVT and pulmonary thromboembolus. Such guidelines should prescribe a low threshold for diagnostic imaging and/or D-Dimer blood testing especially in cases where no clear explanation is available for the symptom of calf pain.

5) That general practitioners be advised to consider the possibility of the existence of DVT in all cases of calf pain and not to exclude such a diagnosis on the basis of clinical signs and symptoms alone. In this regard general practitioners and physiotherapists should be advised to explore thoroughly with the patient the following, including but not limited to:

   a) risk factors including recent long haul air travel;

   b) the existence of symptoms, not only those attributable to DVT attributable to DVT, but also attributable to pulmonary thromboembolus such as chest pain, palpitations and shortness of breath;

   c) possible explanations for the existence of calf pain, including whether there has been recent trauma;

6) That general practitioners be advised to accord significant weight in diagnosing or excluding DVT or pulmonary thromboembolus to the opinions of other health care practitioners such as physiotherapists who may be providing treatment to the patient, and in particular to communicate with any other such health care practitioner about the possibility of DVT or pulmonary thromboembolus where there is no obvious cause for the symptoms that the patient may be displaying.

9.5. Finally, it should be mentioned that in the opinion of two practitioners, namely Dr Karen Heath in respect of Mr Byrne, and Professor Cade in respect of both deceased persons, it would be advisable for genetically related family members of both Mr Byrne and Mrs Weaver to seek medical advice regarding screening for possible inherited thrombophilias.

Key Words: Deep Vein Thrombosis (DVT); Misdiagnosis

In witness whereof the said Coroner has hereunto set and subscribed his hand and Seal the 24th day of April, 2015.

Deputy State Coroner