



*Western*

*Australia*

## RECORD OF INVESTIGATION INTO DEATH

Ref No: 17/13

*I, Evelyn Felicia Vicker, Deputy State Coroner, having investigated the death of **John Gregory Squires** with an Inquest held at the Geraldton Coroners Court, Geraldton Court House, Geraldton, on 29 April to 2 May 2013 find the identity of the deceased was **John Gregory SQUIRES** and that death occurred on 2 September 2009 at Geraldton Regional Hospital as the result of Pulmonary Thromboembolism in Association with Deep Vein Thrombosis in the following circumstances -*

Counsel Appearing :

Ms E Winborne assisting the Deputy State Coroner

Ms R Young (instructed by State Solicitors Office) appeared on behalf of WA Country Health Service (WACHS)

Ms M Smith (instructed by Avant Law) appeared on behalf of Mr M Menezes

Mr G Stubbs (instructed by ANF) appeared on behalf of Nurses Tanya Fitzgerald and Janine Glasson

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## INTRODUCTION

John Gregory Squires (the deceased) travelled from Carnarvon to Geraldton for a laparoscopic cholecystectomy and operative cholangiogram to be performed at Geraldton Regional Hospital (GRH) because the hospital in Carnarvon did not have the appropriate facilities to conduct or manage the necessary procedure.

The laparoscopic procedure was carried out on the afternoon of the day of his arrival in Geraldton (31 August 2009), without complication. His recovery was unremarkable other than a low oxygen saturation which required ongoing low level oxygen therapy. He was transferred to a ward and appeared to be managing well.

The following morning he seemed to have recovered very well and the clinicians believed he was fit for discharge. Due to his need to travel he was maintained in hospital for another day until his expected travel time. His observations were continued. Following the morning clinical round on 1 September 2009 the Integrated Progress Notes (IPN) and Observations Chart (Obs) record some significant drops in oxygen saturations on room air. These appear not to have been brought to the attention of medical staff.

On the morning of 2 September 2009 the deceased reported to nursing staff he was experiencing chest pain, dizziness and sweating. Nursing staff requested an urgent review by the medical staff and the deceased was assessed by Dr Abraham (RMO) followed by Dr Varghese (SMO).



Investigations were undertaken but the deceased deteriorated and went into cardiac arrest at 10.53am. Resuscitation was commenced and continued until 11.22am when it was considered there could be no more benefit to the deceased and all resuscitation was discontinued.

The deceased was 47 years of age.

### **ADMISSION TO GERALDTON REGIONAL HOSPITAL**

The deceased attended for his proposed surgery on the 31 August 2009 following a five hour coach trip from Carnarvon that day. On arrival he was reviewed by student nurse Janine Glasson for his pre-operative checks and observations. At that time the deceased's general observations were satisfactory although his oxygen saturation was slightly

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<sup>4</sup> Exhibit 5 MR140 + IPNs Transcript 1 May 2013 Menezes P194-195

<sup>5</sup> Exhibit 5 IPN 25/8/09 at 0650 hours

<sup>6</sup> Exhibit 1 Tab 17

<sup>7</sup> Transcript 1 May 2009 Menezes p186-7



low at 94% and his pulse elevated at 103 per minute. He weighed 107.8 kilograms.

One of the pre-admission requirements is the nurse complete a Venous Thromboembolism (VTE) Risk Assessment Form<sup>8</sup>. On the form Ms Glasson classified the deceased as 'high risk' after following the check list for the assessment. She had initially qualified the deceased as 'low risk' but on discussion with her supervising nurse had elevated it to high risk in view of the fact the deceased was over 40 years of age, the surgery was considered to be high risk because it was in the intra-abdominal area, and his BMI was in the obese range. Where a patient has been classified as 'high risk' the form instructed anticoagulant prophylaxis was indicated and that TEDs should be used. Accordingly Ms Glasson measured and fitted the deceased with TED stockings at 11.20am, but intermittent pneumatic compression was not considered necessary. The anticoagulant prophylaxis recommended on the form is either Clexane 20 mg daily, or low molecular Heparin 2500U daily, or low dose unfractionated Heparin 5000U twice or three times daily for five to ten days duration.

In evidence both Dr Thyer, Registrar in Surgery at that time, and Mr Menezes, stated it was accepted laparoscopic procedures were generally considered to be less risky from the VTE aspect than open surgery due to the usually reduced surgery time and quicker recovery, necessitating less immobility.<sup>9</sup> There was an added issue however of the creation of a pneumothorax for laparoscopy which may affect

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<sup>8</sup> Exhibit 1 Tab 17 Form MR90a

<sup>9</sup> Transcript 1 May 2013 Thyer P131 Menezes P131



the weighting of risk factors. In addition cholecystectomy is generally accepted to be a less time hungry operation than major joint surgery which requires a much longer period of anaesthesia. It is also accepted anti-depressant medication, which the deceased still required, can affect coagulation.

Dr Thyer, who assisted Mr Menezes in surgery that day, was surprised the post operative time assessment for the procedure was 87 minutes. Dr Thyer recalled the operation as being quick and efficient and Mr Menezes pointed out a considerable amount of preparation and post-operative procedures could expect to be included in that time frame. Overall, pre operatively both Mr Menezes and Dr Thyer considered the deceased to be lower rather than high risk for VTE.

The fact the deceased had travelled five hours by coach from Carnarvon that day was unknown to both Mr Menezes and Dr Thyer and in August 2009 it is not clear that would have made a significant difference to their appreciation of an elevated risk for the deceased. Now Mr Menezes agreed he would not have performed surgery on the same day as prior long distance travel, although I note the Wells Risk Factor score for VTE is still silent on the pros and cons of long haul travel.

Mr Menezes did refer to some literature more recently from the States which he believes elevates consideration of the weighting of travel as a risk factor.<sup>10</sup> The publication to which

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<sup>10</sup> American Heart Association P184-5



he referred was from 2012 while Dr Jamieson, Regional Medical Director WACHS referred the court to a 2011 “*Deep Venous Thrombosis Risk Stratification*” publication, and an April 2013 “*Wells Scoring System*” for the assistance of the Court. I note recent surgery or “*immobilisation within the last 30 days*” are now scored under clinical characteristics. This would imply a difference between immobilisation generally and that necessarily associated with surgery.

Following the preoperative checks the deceased was taken into theatre on the morning of 31 August 2009 where the surgeon was Mr Menezes, with an anaesthetist Dr Menezes, and Dr Thyer assisting. Neither Mr Menezes or Dr Thyer can now recall exactly who performed the surgery or whether it was shared. In evidence Mr Menezes indicated it was his practice to speak with patients prior to surgery if possible, however, it may not have been depending on the length of his list and the time at which the deceased had attended hospital. Dr Thyer believes he obtained the pre-operative consents but cannot recall the deceased from that contact.

The preoperative anaesthetic record indicates the deceased’s history of schizophrenia, and lists his medication as Respirodol injection biweekly, anti-depressants, Escitalopram 20 mgs daily and oral Paliperidone 9 mgs every night. His history of gastric reflux is noted as positive and under the box referring to smoking there is written “*stopped 8 years*” which does not tally with his Carnarvon Medical Centre



history and may have been a misunderstanding of “stopped 9 months.” There are no entries under the problem list or plan.

The anaesthetic chart shows the operation commenced at 1300 hours and the deceased was given common anaesthesia, an antibiotic, and was administered a prophylactic anticoagulant, “*Heparin 500 S/C*”. IV fluids were administered.

In evidence Mr Menezes explained the use of Heparin at the start of an operation as a way of obtaining the best result operatively for the patient with anticoagulation. The aim was to not provide it too early to prevent excessive bleeding, but stabilise the operation with appropriate coagulation necessary for wound repair.<sup>11</sup> Mr Menezes did not consider with the history the deceased had presented there was any need for twice daily prophylactic Clexane or Heparin as outlined on VTE Risk Assessment Form. He considered the form was appropriate for a tick and check, but discouraged thinking. It was his view, with his experience, the deceased was not a risk for VTE. He stated he was unaware of the travel and had he known of five hours travel on the day of the operation he would have postponed surgery overnight.

In evidence Dr Thyer stated he had no recall of the deceased prior to the operation or specifically during the operation, although he believed the operation was fast and

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<sup>11</sup> Transcript 1 May 2013 P189-190



efficient with no complications. Dr Thyer indicated his main recollection of the deceased came the following morning.<sup>12</sup>

Both Dr Thyer and Mr Menezes indicate the operation proceeded well and there were no complications. Throughout the laparoscopic cholecystectomy and operative cholangiogram the deceased's blood pressure remained reasonably normal and both anaesthesia and surgery were uncomplicated.

The deceased was transferred to the recovery room at 1520 hours and the recovery room records, recorded contemporaneously by Enrolled Nurse Margaret Rowe, indicate his observations were satisfactory except for a low oxygen saturation varying between 91% and 93%. He received two doses of morphine while in recovery. EN Rowe indicated she did not consider the low oxygen saturations to be of concern during the recovery period and it was a frequent occurrence. She stated the deceased obtained a normal oxygen saturation with minimum oxygen therapy by way of a Hudson mask and she was not concerned about his recovery.<sup>13</sup>

## ON THE WARD

The deceased was returned to the ward at 1640 hours on 31 August 2009. His oxygen saturation improved to 98% on 8 litres of oxygen via a Hudson mask at 1810. The IPNs on the 31 August 2009 records a concerning drop in the deceased's oxygen saturations to 89% on room air which returned to 97%

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<sup>12</sup> Transcript 1 May 2013 P154

<sup>13</sup> Transcript 30 April 2013 P90-91





with a nasal prong. All his other observations remained normal and by 2035 hours his oxygen saturation was 97% on two litres of oxygen via a nasal prong.

The nursing plan indicates the deceased's observations on the ward were to be undertaken (4/24) which we were informed by Ms Christine Cream, Nursing Director, WACHS, was an accepted medical abbreviation requiring four hourly observations. Regardless of whether this is accepted medical terminology, Ms Cream also advised the inquest the minimum observations required on any patient on the medical/surgical wards were four hourly. The only alteration to that was if there was a specific direction for more frequent or less frequent observations. The MR140, Temperature and General Observations Chart, clearly states "*four hourly use, use a block of three columns per day*". Regardless of the accepted abbreviations, the evidence indicated where there is a concern with a desaturation prudent nursing care would, in 2009, correct a desaturation by the use of nasal prongs or mask and reassess the oxygen saturation to determine the extent of any improvement.

It is also clear from the IPN there are occasions where the notes are used by nursing staff to record observations instead of the charts. I accept the chart for the 1 September 2009 contains four entries over a 24 hour period, however, they are not consistently at either four or six hourly intervals.

Evidence was given some of the nursing staff would record information separately, and at the end of their shift



when they wrote up the IPN would enter their findings there. The result is a combination of observations in the IPN and the MR140 which effectively need to be used together to obtain a good understanding of the vital signs or clinical findings.<sup>14</sup> Evidence was also given by Dr Abraham (SMO) that on the morning rounds the medical staff used the charts<sup>15</sup> and not the IPN to assess a patient's clinical condition aside from their visual presentation. This resulted in the difficulty that on a busy ward round the complete picture of a patient's clinical status may not be as readily observable as if the MR140 was only, and always, filled out contemporaneously. Dr Abraham had not noted, when she assessed a patient, a possibly concerning notation in an IPN directly above her own entries for a ward round made.

The main concern with the deceased overnight from the 31 August to the 1 September appears to have been some difficulty with his fluid retention. Although the deceased had not passed urine by the time stated as desirable, it is clear this did improve during the course of the morning of 1 September 2009 and achieved the acceptable retention on the bladder scan of less than 500 mls.

The medical ward round on the 1 September 2009 occurred in the morning. A senior nurse would accompany the doctors on the ward round and keep them apprised of any concerns the nursing staff had. Dr Abraham, who was the scribe for the round, stated she made notes during the course of the round for which she also had a copy of the

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<sup>14</sup> Transcript 29 April 2013 P66-67

<sup>15</sup> Transcript 30 April 2013 P109



patient's MR140. She stated she completed the IPN after the round when she had the opportunity to sit down and fill out the IPNs appropriately. From that it is clear the morning round with herself, Dr Thyer and Mr Menezes occurred some time before 11am. Mr Menezes said he believed it was usually earlier in the morning due to his need to perform the theatre lists. It was his recollection the rounds were some time around breakfast. At the time of the ward round I am satisfied the deceased's MR140 indicated oxygen saturations of 95 and 90% on room air. The following saturation of 87% on room air had not been observed prior to the ward round.

Dr Abraham gave evidence she would have been concerned at anything less than 95% oxygen saturation on room air,<sup>16</sup> however Mr Menezes was the consultant for the deceased and she would follow his instruction.

All three doctors on the ward round indicated their main recollection of the deceased was how well he looked when reviewed. He was up and dressed in his own clothes, he had showered and was eating his breakfast. Dr Thyer, in particular, said there was nothing in the deceased's presentation which would warn the medical staff of a concern. Both Dr Thyer and, especially Mr Menezes, indicated a solitary drop in oxygen saturation would not have concerned them at that time without some other indicator the patient's clinical signs were not appropriate. Dr Thyer was quite clear he has modified his practice since 2009 to take more note of the



possibility of the development of VTE and pulmonary embolus (PE).<sup>17</sup>

The IPN note by Dr Abraham states:

“Day 1 Post Op

Tolerating free fluids. Able to void, residual urine 410mls on bladder scan.

Plan:

- 1 Drain out by pm today
- 2 Full normal diet
- 3 Can go home on Wednesday to Carnarvon for follow up with GP in a week
- 4 Intravenous antibiotics to continue”

Dr Thyer said the intention was to discharge the deceased that day, however, in view of the fact he needed to travel to Carnarvon he was maintained in hospital overnight to ensure he was well rested but mobile for release into the community.

The morning nursing entry for the 1 September 2009 was written at 1450 hours but certainly refers to issues earlier in the day.

That nursing note indicates the deceased’s oxygen saturations decreased significantly after he showered that morning to 80%. This would have been prior to the doctors’ round but is not recorded on the observation chart which Dr Abraham said was the information she carried with her during



the round. The IPN was clearly written later. It would appear the Snr Nurse accompanying the round did not mention the significant desaturation to the doctors on the round, if she was aware of it. After the supply of oxygen via nasal prongs the deceased's oxygen returned to 92%. This is still relatively low considering oxygen therapy was being provided.

The nurses concerned had no recollection of the events but believed their practice would have been to draw this to the attention of the clinical nurse or supervising staff. Usually that also would be recorded in the notes. There is no entry in the notes and in view of the medical practitioners' view an isolated oxygen desaturation alone was of little concern in 2009 I understand the return to an oxygen saturation of over 90%, post operative period, was considered to not warrant medical attention at that time in GRH.<sup>18</sup>

Tanya Fitzgerald was the RN on duty for the afternoon shift and her entry in the IPN, again probably towards the end of her shift, although she has recorded observations in the MR140 states *"Nursing note 2100 hours – all vital signs within his normal range bar saturations 87% room air, nasal cannula 2 litres PRN. No history of smoking or lung disease. Has not required any breakthrough pain relief. Post residual bladder scans 85mls. Ambulating to toilet independently. Tolerating water diet plus fluids."*

There is no record of a follow up oxygen saturation to determine the effect of the nasal cannula and 2 litres PRN, but

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<sup>18</sup> Transcript 29 April 2013 P76



RN Fitzgerald was clear she would have followed up that observation and would have entered it if it was of concern. She has no memory but believes if there had not been a satisfactory improvement she would have drawn it to someone's attention.<sup>19</sup>

RN Rosemary Weber came on duty for the night shift and was clear she did not believe there had been any concerns about the deceased communicated to her at handover.<sup>20</sup>

RN Weber made her entry in the IPN on 2 September 2009 at 0210 hours and indicated the deceased's oxygen saturations remained between 89 and 92% on 2 litres via nasal prongs. This caused her to ask him to do deep breathing and coughing as a form of therapy. This resulted in an elevation of his oxygen saturations to 94-95% on 2 litres via nasal prongs. Due to the improvement and the deceased's apparent "*wellness*" overall she did not consider it was necessary for her to take any further action. Certainly on the protocols in place in GRH in 2009 that was probably correct.

While Dr Abraham indicated a desaturation to 80% would have been of concern to her, as did Dr Varghese, Mr Menezes indicated he would not have been particularly concerned. Especially in view of the fact the deceased's history in Carnarvon indicated low oxygen saturations and desaturations with good recovery on supplied air appeared to

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<sup>19</sup> Transcript 30 April 2013 P98, p100

<sup>20</sup> Transcript 29 April 2013 P77



be normal for the deceased.<sup>21</sup> Dr Thyer stated he would have wanted to know about a desaturation to 80% but indicated at that time desaturations to 90%, provided they improved, would not have been of significant concern without some other indication the patient's clinical signs warranted further investigations.<sup>22</sup>

Certainly the observations recorded for the deceased on his MR140 remain within a reasonable range, with the explanation the 87% improved with low level oxygen therapy.

## **2 SEPTEMBER 2009**

The morning observations for the deceased that are recorded are not of concern, and no-one can recall whether there had been a ward round which included a review of the deceased<sup>23</sup> before the deceased complained to the nurses he was experiencing chest pains, dizziness and sweating. Dr Abraham was called to review the deceased and was very concerned at his presentation. He had a pulse of 110 per minute, a blood pressure of 112/60, he was afebrile, with a blood sugar level of 10.1. She recorded chest crackles on the right lower lobe and instigated a number of investigations to assist more senior medical staff on their review.

An IV line was placed in situ and bloods taken for a general review of the deceased's status. A coagulation profile and D-Dimer were also requested. Dr Abraham's preliminary

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<sup>21</sup> Transcript 1 May 2013 P194

<sup>22</sup> Transcript 1 May 2013 P162

<sup>23</sup> Transcript 1 May 2013 P164



differential diagnoses were 1) pulmonary embolism 2) chest infection. Dr Abraham implemented a plan

1. “IVF for N saline.
2. Ceftriaxone 2mg BD
3. Aspirin 300 mg stat plus 5 litres oxygen O<sub>2</sub> plus Nexium 40 mg
4. Informed HDU and Dr Angad → Transfer to HDU”

Dr Thyer and Dr Varghese attended. It is clear the clinicians were seeking transfer of the deceased to the High Dependency Unit (HDU) however there were no beds available and the senior consultant on call was involved in a critical incident. His senior medical officer, Dr Varghese, attended the deceased.

Dr Varghese wrote a retrospective note at 1130 hours. I understand the family’s concern with the retrospectivity of some of the entries, many of the entries, in the deceased’s IPN however it is not uncommon, where patients require input, for there to be no time for clinicians or nurses, unless specifically appointed as a scribe, to write notes during a medical crisis or busy shift.

Dr Varghese has summarised his management of Mr Squires in the following way. His first contact was on the morning of 2 September 2009 “*at around 9.30am*” after being asked to review the deceased by Dr Thyer, the surgical registrar, and Dr Abraham. Dr Varghese noted the chest pain, sweating, dysnopea, hypertension and tachycardia. “*I considered the possibility of pulmonary embolism, sepsis,*





*internal bleeding or myocardial ischaemia. I advised to give aspirin and increase oxygen*". He then ordered investigations, some of which were already implemented by Dr Abraham, and asked for transfer to the HDU. He reviewed the results of the tests and investigations which had already been performed and provided the deceased with antibiotics and low molecular weight Heparin after having been able to confirm there was no gross internal bleeding.<sup>24</sup> The inquest was advised anticoagulant medication is contraindicated where there is internal bleeding as the result of surgery. Anticoagulant therapy, if there is internal bleeding, can cause the patient to bleed excessively very quickly, and go into hypovolemic shock, and even death.

The deceased was given Clexane 100mg subcutaneously at 10.35hrs, before he arrested, because Dr Varghese was sure by that stage there was a pulmonary embolism and no internal bleeding.

Dr Varghese indicated the deceased initially improved and as there was no bed available in HDU he was maintained where he was, however, that ward and bed was close to theatre and had all the necessary monitoring equipment. It was his view the situation for the deceased was not compromised due to his not being in HDU.<sup>25</sup>

Dr Varghese discussed his provisional diagnoses with the consultant in HDU and they considered *"the option of doing a CT pulmonary angiogram once the patient became more*

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<sup>24</sup> Transcript 29 April 2013 P19

<sup>25</sup> Transcript 29 April 2013, Varghese P38



*stabilised*". However the deceased arrested before that could be done.

Resuscitation continued between 10.53 and 11.22 hours when Dr Varghese determined there was no benefit to the deceased in further resuscitation and he was declared deceased.

Attempts had been made by nursing staff and doctors to contact the deceased's senior next of kin, Mrs Brambley, during this period however that was unsuccessful until she returned a call. The clinicians were in the midst of attempting to resuscitate the deceased and she was not given a definitive answer as to his status, other than to advise her he was critical. I understand the family found this disconcerting however trust understanding the situation facing the hospital at that time made prolonged explanation a lower priority than actually attempting to resuscitate the deceased.

The IPN do indicate a scribe was used during the crisis and that additional information was written retrospectively. The timelines records the course of the crisis for the deceased between 10.45 and 11.22am on 2 September 2009.<sup>26</sup>

### **POST MORTEM REPORT<sup>27</sup>**

The post mortem examination was carried out by the Chief Forensic Pathologist, Dr Clive Cooke on the 4 September 2009.

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<sup>26</sup> Exhibit 1 Tab 17

<sup>27</sup> Exhibit 1 Tab 5



The brief summary of Dr Cooke's internal examination indicated:

"... blood clots in the arteries to each of the lungs (pulmonary thrombo-embolism), with residual clots in the deep veins of both of the legs (deep vein thrombosis).

There had been recent abdominal surgery (laparoscopic cholecystectomy); the operative site was unremarkable. There was early arteriosclerotic hardening of the arteries; the body organs appeared to be otherwise healthy".

As a result of those findings Dr Cooke indicated the cause of death for the deceased was pulmonary thromboembolism in association with deep vein thrombosis.

The detail of Dr Cooke's examination of the deceased's respiratory system indicates there were coils of occlusive purple coloured thrombus in the main pulmonary arteries to each of the lungs, extending into the first and second generation branches. The thrombi appear to be free-lying, not apparently attached to the vessel wall.

Dr Cooke was not called to give evidence as to the detail of his examination which would have been possible, however, the clinicians called at the inquest were able to comment and the indications are there was a very large thrombus occluding the pulmonary arteries and it appeared to be a recent clot.<sup>28</sup>

In evidence Dr Jamieson, Regional Medical Director for the mid-west region of WACHS, queried the origin of the

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<sup>28</sup> Transcript 29 April 2013 P33



deceased's emboli as originating from the deep veins of the calves. This was in the context of many persons suffering DVT are asymptomatic and do not know of a propensity for VTE.<sup>29</sup>

I asked, via email, if Dr Cooke could assist with this. By return e-mail Dr Cooke advised he had reviewed his notes for the deceased and provided this information:

“The iliac veins are cut through with removal of the pelvis organ. I think residual thrombus at that level would have been seen, but I haven't noted any. I couldn't comment further down to the hip/thigh (ie femoral vein) region as we don't usually cut into that part of the legs.

With there being residual thrombus in both calves it seems likely the dislodged thrombus which has travelled to the lungs would have broken off from higher in the legs, but again I couldn't say how high.”<sup>30</sup>

With respect to undiagnosed pulmonary embolus I intend to refer to an earlier inquest in which Dr Cooke gave extensive evidence.<sup>31</sup>.

The following excerpt is from pages 21-22 of that finding for which unfortunately there is no transcript for the purpose of reference. There are however, recordings of the evidence in the event there is any dispute as to my summary of that evidence.

“Dr Cooke advised the court he probably saw cases of death from undiagnosed pulmonary embolus once a month. These often were in cases where the deceased had been a traveller of one sort or another, be it long haul flights or long periods of immobility while travelling in coaches or vehicles

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<sup>29</sup> Transcript 2 May 2013 P229

<sup>30</sup> A personal communication Dr Cooke 14 May 2013

<sup>31</sup> Inquest 11/05 relating to a death in January 2003 which was not post operative but occurred some time after multiple long haul flights in an otherwise healthy 31 year old male



One assumes these persons were asymptomatic prior to death or the significance of any symptoms observed was not appreciated by either the patient or their family.

While the incidence of pulmonary embolus was more frequently recorded after surgery these are often diagnosed because practitioners are aware of and take very seriously the risks of thrombosis and pulmonary emboli following periods of surgical intervention and the resultant immobility.

Dr Cooke referred to the court literature confirming the dangers of treating undiagnosed patients with anti coagulants for DVT. The universally accepted position is that the clinical features of DVT are non-specific and that over half the cases of clinically suspected DVT are not confirmed by objective testing while patients with significant DVT may have only minimal symptoms and signs. Experience indicates the diagnosis is improved by considering the number and type of risk factors present. (Diagnostic Tests: Diagnosis of deep vein thrombosis. Tay Jam Chin and Michael McGrath Aust Prescr 1998; 21; 76-8).

This article considers long distance travel and severe obesity as risk factors.

Dr Cooke noted the deceased was a man of heavy build.”

In that case the deceased had attended on his general practitioner three times complaining of, amongst other things, pain in his knee or calf and shortness of breath on exertion. The diagnoses at that stage were muscle strain from his travels or late onset adult asthma. Pulmonary thromboembolus was not seriously considered as a diagnosis until after the deceased arrested. The aim of that inquest in 2005 was to elevate the awareness in general practitioners of DVT and PE. This was despite the Wells Clinical Prediction Guide not rating immobility, other than post operatively, as a risk factor to be considered. In the circumstances in remote Western Australia, and indeed much of remote Australia, the fact is many patients will consistently experience periods of reduced mobility, as opposed to complete immobility, due to



the need to travel long distances, and the prospect of dehydration due to the environmental conditions.

## **CONCLUSION AS TO THE DEATH OF THE DECEASED**

I am satisfied the deceased was a 47 year old male of heavy build who was attempting to lose weight and generally improve his level of fitness. He suffered schizophrenia and depression, for which he was medicated, and resided in Carnarvon, which for the purposes of medical intervention, must be considered a remote location despite the presence of a district hospital. Indeed, in real terms Geraldton Regional Hospital can also be considered remote in that it does not have easy access to a major tertiary teaching hospital with its specialist facilities and resources.

The deceased experienced periods of recurrent cholecystitis and gallstones to the extent it was considered necessary his gallbladder be removed. He was reviewed by Mr Menezes on one of his visiting consultations to Carnarvon.

Surgery was scheduled in Geraldton for the 24 August 2009, however, the deceased was at that time unwell in Carnarvon District Hospital with cholecystitis and it was preferable the inflammation be stabilised prior to surgery.

The surgery went ahead on 31 August 2009 following the deceased travelling from Carnarvon to Geraldton by way of coach that day. The deceased at no time complained of any symptoms identified with VTE and disclosed no history which would alert medical practitioners to a propensity to



coagulation issues. He had experienced oxygen desaturation while in Carnarvon District Hospital which remained largely unexplained as possibly symptomatic to this patient for an unknown reason.

Surgery was undertaken on the afternoon of 31 August 2009 and went well with no apparent problems. While the nursing staff and hospital protocols had indicated the deceased was at high risk of VTE and required prophylactic anticoagulant medication, the surgical staff considered the deceased to be 'low' rather than 'high' risk. Anticoagulant medication was used for the surgery to obtain what was, hoped to be, appropriate weighting for desirable coagulation during the process of the operation. It was not ordered post operatively.

The following morning the deceased was reviewed by the surgical team and medical staff and appeared to be "extremely well". He was easily mobile, was not short of breath, did not show any discrepancies in his pulse or respirations and was considered to be the last patient one would expect to suffer a PE.

The recorded oxygen desaturations by nursing staff were quickly elevated by the use of low level oxygen therapy and as such did not remain at levels which under the protocols in place at that time required review by a doctor.

Following the ward round on 1 September 2009 there were further periods of low oxygen saturation on room air, but



not below 90% on low oxygen persistently, and so did not attract the attention of medical staff.

On the morning of 2 September 2009 the deceased experienced shortness of breath, dizziness and nausea. He alerted the nursing staff who immediately contacted the doctors. The deceased was appropriately reviewed and the medical staff instigated relevant investigations to determine the safety of administering anticoagulant medication in a post operative patient who may be experiencing internal bleeding. Once the blood results confirmed the unlikelihood of internal bleeding the deceased was given Clexane, however, it was not in sufficient time to alter the prognosis for the deceased who then arrested and could not be revived.

The attending clinicians were satisfied the deceased had suffered a pulmonary embolus, which was later confirmed by an internal post mortem examination.

I find death occurred by way of Natural Causes.

### **COMMENTS ON THE CARE OF THE DECEASED BY THE PUBLIC HEALTH SYSTEM.**

The inquest heard evidence from Dr Jamieson, Regional Medical Director WACHS and Ms Cream, Nursing Director WACHS. Neither of those persons were in those positions at the time of the death of the deceased, but attended the inquest to provide information as to changes in hospital policies and procedures with respect to elevating the awareness of the potential for death by VTE following an operative procedure.





Since the death of the deceased in December 2009 there has been a change in hospital policies throughout hospitals operated by WACHS. There are two policies which may have been relevant to the outcome for the deceased when his history is assessed with regard to his death by pulmonary embolism following his operation in GRH.

In September 2009, although the hospital had a process for recognition of patients at risk of VTE by nurses, it was, and still is, subject to a final decision being made by the supervising clinicians. The death of the deceased has served to highlight the need for clinicians to elevate their awareness of the potential of VTE leading to PE post-operatively by active consideration of potential risks in conjunction with active involvement in clinical recoveries. Nurses are now assisted in making the assessment as to when to involve clinicians by the implementation of two major intervention tools.

These are the oxygen therapy protocol<sup>32</sup> and the new Adult Observation Response Chart<sup>33</sup>, or “rainbow chart”, which, when used with the pre-existing updated medical emergency responses,<sup>34</sup> mandates nurses take specified action in response to recorded observations. This removes from nurses the decision making as to when to involve clinicians to actively review a patient.<sup>35</sup>

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<sup>32</sup> Exhibit 1 Attachment 18 Tab 5 and Tab 6

<sup>33</sup> Exhibit 1 Attachment 18 Tab 7 and Tab 8

<sup>34</sup> Exhibit 1 Attachment 18 Tab 9-13

<sup>35</sup> Transcript 30 April 2013 P93



“Table 1

Indication	Examples	Oxygen prescription	
		Initial Therapy oxygen	Target oxygen saturation
Critical illness	Major trauma Shock	Reservoir mask 15 L/min	94-98%
Suspected Type 1 (hypoxaemic) respiratory failure	Severe asthma Pulmonary embolism Pulmonary oedema Pneumonia Diffuse lung disease	Nasal cannulae 2-4 L/min or Simple face mask 5-10 L/min	94-98%
Suspected Type 11 (hypercapnoeic) Respiratory failure	Severe COPD Severe bronchiectasis Morbid obesity Sleep apnoea Neuromuscular disease Kyphoscoliosis or other chest wall deformity	Venturi mask 24-28%	88-92%
Normoxic patients in whom O <sub>2</sub> therapy is commonly used but of uncertain value	Acute coronary syndromes Opioid infusions Advanced malignancy	Nasal cannulae 2-4 L/min Or Simple face mask 5-10 L/min	94-98%
Special cases of poisoning A	Carbon monoxide	Reservoir mask 15 L/min	100%
Special cases of poisoning B	Paraquat Bleomycin lung toxicity	Venturi mask 24-28%	88-92%

<sup>36</sup> Copy of Pg 4 of Protocol, Exhibit 1, Attachment 18, Tab 5 & 6



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**Medical Emergency Response Call**

<b>Response Criteria:</b> <ul style="list-style-type: none"> <li>Any ot.oo.-v"lor III a purpo+rea</li> <li>Airway throal</li> <li>Respiratory or cardiac rrc t</li> <li>SpJ-d-kin Will In IQJl of con+ne"</li> <li>Drop In O<sub>2</sub> sa.WI dJ on.s84%</li> <li>S rorc</li> </ul>	<b>Actions Required</b> <ul style="list-style-type: none"> <li>Preo Em.o.rgcoy call</li> <li>Initiate ALS/SLS protocols</li> </ul>
cjonot it the abovu arto.itl	
<b>Response- Criteria.</b> <ul style="list-style-type: none"> <li>Any observation in n rod_o3 O</li> <li>N&gt;v or unrdontl_g-ch(-Sp:dn</li> <li>New or unrd o-nhgshct loss of brea(h</li> <li>Increased cr.t.lnG&gt;p.ctodHud or tloodtoss</li> </ul>	<b>Actions RequirOO</b> <ul style="list-style-type: none"> <li>Ooc or to rovtovt palic:rt wt.hio 30 minuiQJ ! (vá phono or n person)</li> <li>ccond obser#(tions &lt;vry 15 minutes</li> <li>If medical' f'CO'le'u no I mended wthin so</li> </ul>
- Drop In O <sub>2</sub> saturation 90%	
• BGL < 3cx > 19	
• Lfino cup:Yts 29ml/h	

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<b>Re-sponse Criteria</b>	<b>Sen or Nurse Hevew</b>
Any obser[ vation In an orange area You vvWrrlu.d about 1h Opeti'ont bit th(O) do not fit the abovo critia	<b>Acti(InS Ryquired</b> <ul style="list-style-type: none"> <li>Sort Nurso must rrvlew patient</li> <li>Sort Of Nurao must con Medicnt omcur to discuss with hra CUnka ROVCIIS</li> <li>Accord obsorvtr'tti toast oneo or Jory II O, r Aolllow o r' &lt;XIIIromort</li> <li>Manage tevorj).lin, nut:stillo&lt;xtlO'..s or ds.-es.s</li> </ul>

**Increased Surveillance**

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In the case of the deceased the hospital VTE Risk Assessment had categorised him as at high risk of VTE based on his age, operation type and build. Student Nurse Glasson had implemented the nursing requirements for that assessment by measuring him and fitting him with TEDs. Thereafter the decisions needed to be those of the clinicians on the information they had. On that information both Mr Menezes and Dr Thyer did not categorise the deceased as high risk, due to his build, age and type of operation. From the clinicians' perspective the laparoscopic procedure reduced the risk of the fact the operation was intra-abdominal and the deceased's build as heavy removed the obese marker as far as Mr Menezes was concerned.

In evidence Mr Menezes stated the deceased did not, in his view, warrant a higher risk status on that evidence but agreed he would now prefer more information on the deceased's travel arrangements in proximity to the enforced immobilisation of the operative procedure.

Dr Thyer indicated his whole practice now is to be more aware of the issue of VTE in and around operative procedures.

Dr Jamieson explained in evidence the procedures put in place in WACHS and in Health Department Operational Guidelines have always been implemented as the result of the combined input of multi disciplinary expert advice. They do not replace appropriate clinical decision making, but set out best practice as perceived by those experts when taking into account many different considerations which require relevant



weighting against one another, and so attempt to weave a pathway between competing risks.<sup>38</sup>

Dr Jamieson pointed out that of completely unexpected deaths, 80% were due to pulmonary emboli. It was therefore a significant factor which needed to be actively considered and attempts made to intervene with appropriate prevention strategies as part of best hospital practice. There is a Commonwealth Health Department produced “Clinical Practice Guideline for the Prevention of Venous Thromboembolism in Patients Admitted to Australian Hospitals,” published in November 2009.

The death of the deceased from the VTE leading to PE suggests elevated clinical regard to possible pre-and post-operative factors may be warranted, especially in conditions in remote Australia.

In addition to the issue of hours of travel immediately preceding an operative procedure, is the relevance of clinical signs, in isolation, to the diagnosis of PE. The issue for the nurses with the deceased’s oxygen desaturations, without any other supporting clinical abnormalities, was the significance attached to that issue, in isolation.

It was clear Mr Menezes did not consider the oxygen desaturations to be of great significance without some other indication there was a genuine difficulty with clot formation or blood flow. This would make it difficult for a nurse to

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<sup>38</sup> Transcript 2 May 2013 P226/7



determine at what point a clinician should be involved in reviewing a patient with respect to a need for oxygen therapy. All the nurses were comfortable with a desaturation to 90% on room air, provided it corrected quickly with oxygen therapy to an acceptable level, and there were no other observations of concern.

It is clear the deceased did present well and none of the nurses thought the observations indicated anything other than he was recovering appropriately for him as an individual patient. Proper use of the 'rainbow' chart would necessitate it be used as the appropriate place to record all observations in a timely manner.

The deceased did need oxygen, however, and with the new oxygen therapy protocol it would be necessary that he be reviewed by a clinician. In conjunction with an elevated awareness of VTE this should have promoted some investigations for differential diagnoses which may have altered the outcome for the deceased. There would not be an issue for the nurses as to when to seek review because the "rainbow chart" specifies a significant departure from the expected observations, even in isolation, mandates intervention by a clinician, thus removing from the nursing staff the concern they are being overly anxious about abnormal readings.

Earlier administration of prophylactic anti-coagulation medication may have altered the prognosis for the deceased



had it followed after the significant desaturation to 80% on room air on the morning of 1 September 2009.

Knowledge of the fact the deceased had travelled to Geraldton Regional Hospital by coach on the morning of his operation, necessitating five hours of reduced mobility, may have promoted prophylactic anticoagulation medication, or delaying of the operative procedure, on the part of the clinicians with an elevated awareness of the potential for VTE as outlined by the hospital VTE Risk Assessment Form.

In view of the fact the oxygen therapy protocol and “rainbow chart” are already in use it would seem there is only one potential recommendation arising from the circumstances surrounding the death of the deceased:-

**I RECOMMEND:**

WACHS to facilitate a review of the VTE Risk Assessment Form to consider inclusion of the type/duration of travel of pre-operative patients.

E F VICKER  
**DEPUTY STATE CORONER**

May 2013

