STATE CORONER'S COURT

OF NEW SOUTH WALES

Inquest:	Into the Death of John Gibson
Hearing dates:	23-25 February 2015
Date of findings:	16 March 2015
Place of findings:	State Coroners Court, Glebe
Findings of:	Deputy State Coroner E.Truscott
Catchwords:	Coronial Law-Cause and manner of death-
File number:	2011/387679
Representation:	Counsel Assisting: Mr M. Lynch instructed by Crown Solicitor's Office (Mr A. Mykkeltvedt appearing)
	Mr G. Farmer QC instructed by Meridian Solicitors (Ms N. Brown appearing) for Dr Alison Duchow (Grafton Base Hospital):
	Mr N. Dawson of New Law for Registered Nurse Ms J. Pinkowski and Registered Nurse Mr A. Dodds

Ms L. McFee instructed by MDA Law (Ms D. Jackson) for Dr Graeme Bradley

Ms K. Burke instructed by TressCox Lawyers (Ms K. Keogh and Ms C. Gordon) for Dr Alan Tyson and Dr Craig McCalman and Dr T. Mupudzi

Mr P. Rooney instructed by Hicksons Lawyers (Mr L. Sara) for Mr Dan Madden (Executive Officer GBH-LHD)

Findings:

John Gibson died at 3.50 p.m on 3 July 2011 at Lismore Base Hospital Lismore of right cerebral infarction caused by the infusion of medication between 27 and 28 June 2011 via a Central Venous Line inadvertently inserted into the Carotid Artery at Grafton Base Hospital at about 8 a.m. 27 June 2011. Prior to insertion of the Central Venous Line Mr Gibson was already suffering from respiratory depression (including carbon dioxide narcosis), hypernatremia and alcohol withdrawal syndrome following an emergency laparotomy and right hemicolectomy whilst he had Nephrosclerosis, Liver Cirrhosis and Chronic Obstructive Pulmonary Disorder (emphysema and atelectasis) from a long history of smoking tobacco.

Recommendations: That the Northern NSW Local Health District introduce a policy mandating that practitioners confirm venous placement of Central Lines consistent with the Medical Quality Committee advice to Grafton Base Hospital on 1 December 2011 and the NSW Health Policy Directive PD2011_060.

IN THE STATE CORONER'S COURT

GLEBE

NSW

SECTION 81 CORONERS ACT 2009

REASONS FOR DECISION

1. This inquest concerns the death of 63 year old John Gibson who lived in Grafton NSW. On 24 June 2011 Mr Gibson was admitted into Grafton Base Hospital (GBH) with a life threatening medical condition. He underwent emergency surgery where his surgeon identified caecal volvulus (twisted bowel) with necrosis and serosal tears. Dr Duchow successfully performed a right sided haemocolectomy.

2. Post-surgery he was admitted to the High Dependency Unit which is a 12 bed facility of which 4 are for Highest Level of Care. He was one of those four.

Mr Gibson's condition pre-surgery

3. Mr Gibson's recovery from surgery was complicated due to his addiction to alcohol and nicotine. He smoked up to 60 cigarettes per day and drank a large amount of alcohol each day. He had done so for many years. As a result of his smoking he had obstructive chronic pulmonary disease. Due to his alcohol consumption he was predisposed to alcohol withdrawal syndrome within 2-5 days of ceasing consumption. Symptoms of alcohol withdrawal syndrome can include delirium, agitation and hallucinations and can continue for up to 12 days. Mr Gibson reported that he last consumed alcohol at 10 pm on 21 June 2011. Mr Gibson's sister Ms Gina Francis confirms this date saying that he was very unwell and vomiting up to the period of his admission.

4. Given this history, Mr Gibson was at high risk of suffering respiratory difficulties and alcohol withdrawal post-surgery. Alcohol withdrawal syndrome is treated in NSW hospitals by administering benzodiazepines, namely valium which can have an adverse

impact on a person's respiration. The condition of Mr Gibson's lungs was such that he would have difficulty in expelling both carbon dioxide and sputum. The effect of retaining carbon dioxide could result in a condition which is known as carbon dioxide narcosis, which can cause unconsciousness. Mr Gibson also had bi-polar disorder for which he had been treated for many years with Lithium Carbonate. In an effort to minimise concerns associated with Mr Gibson's mental health, hospital staff continued to administer this medication in the period following his surgery.

Mr Gibson's deterioration after surgery

5. On 25 June 2011 at about 10.30 pm Mr Gibson he began exhibiting symptoms of alcohol withdrawal which was assessed appropriately by nurses in accordance with the GBH's policy[1]. He was given valium (14 doses of 2.5 mg by imi) between 10.30 pm on 25 June and 0830 am on 26 June and due to persisting symptoms he was further dosed 7 times between 1.30 pm on 26 June to 3 am on 27 June. On 27 June he received hourly doses of 2.5mg imi between 1 am and 3 am inclusive. [2]

6. At about 11pm on 26 June 2011, Dr Duchow who was the on call surgical consultant was called into the hospital to review Mr Gibson due to RN Pinkowski's concern that Mr Gibson's respiration might become compromised. Dr Duchow made the following note: *"junky lungs, wavering oxygen saturation rates, delirium with alcohol withdrawals and high use of valium. Keep in mind he smokes 60 cigarettes a day and will surely be a carbon dioxide retainer so, be careful how much oxygen we give. Accept sats 85-95%, respiratory rate of less than 30 (breaths per minutes). Lungs – bilateral with coarse wheeze.* Dr Duchow directed that if Mr Gibson's respiratory rate became greater than 30 or his oxygen saturation rate dropped below 85% he should commence on positive airway support by being placed on a BiPap machine and face mask. [3]

7. At that point Mr Gibson's respiration was supported by High Pressure Nasal Prongs, the machine for which was set so that his respiration rate and oxygen saturation were displayed at all times on an electronic monitor and should the oxygen saturation rate

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[1] Protocol for the use of Clinical Institute Withdrawal Assessment for Alcohol – revised Version (CIWA-AR) Brief of Evidence Vol. 2 Tab 29 p 91-102
[2] Brief of Evidence Vol. 2 Tab 29 pp. 93, 97, 100
[3] Grafton Base Hospital Notes in the Brief of Evidence Vol. 2 Tab 29 p 32

decreased below the set level an alarm would continue to sound, only stopping once an increase to the base level was established.

8. Another complication for Mr Gibson was that he developed hypernatremia, which results in an increase in the body's concentration of sodium levels as water is expelled through excessive urination. This condition was likely due to Mr Gibson's poor kidney function which, in turn, likely related principally to his extensive tobacco smoking history. His long term lithium therapy may also have contributed. A significant increase in sodium concentration such as he experienced carries a risk of cellular damage, particularly in the brain developing oedema, resulting in unconsciousness and brain injury or death. To address this imbalance, the administration of saline fluids was stopped, and he was commenced on a 5% dextrose solution.

9. By about 4 a.m. on 27 June 2011 RN Pinkowski, who was at that stage caring exclusively for Mr Gibson, requested that a BiPap machine be brought to the HDU for Mr Gibson. The HDU BiPap machine was being used by another patient so a machine had to be acquired from the Emergency Department. The machine did not arrive immediately and, as a result, Mr Gibson was not commenced on BiPap until 4.30 am. During that period his oxygen saturation plummeted to 72% - 69% such that he may have suffered some hypoxia. The BiPap assisted Mr Gibson's lungs to take in more air but just as importantly to expel more carbon dioxide, the goal being to avoid carbon dioxide retention and associated unconsciousness. The nursing notes indicate that by 5 am his oxygen saturation readings were up to 86-89%[4].

10. Registered Nurse Pinkowski was highly vigilant monitoring and treating Mr Gibson. She had reallocated the care of her other patients so that Mr Gibson was her sole patient. Mr Gibson was agitated from the alcohol withdrawal syndrome and continually removed the nasal prongs. RN Pinkowski replaced them when this happened and attempted to reassure him. Consistent with the management of Mr Gibson's alcohol withdrawal syndrome he was given valium regularly, the last dose being at 3 a.m.

[4] Grafton Base Hospital records Vol. 2 Tab 29 p 84

11. At 04:49 and 05:02 RN Pinkowski took measurements of Mr Gibson's "Air Blood Gas" to monitor his carbon dioxide and oxygen levels. By 6 a.m. Mr Gibson became unresponsive. RN Pinkowski called a Medical Emergency Team to attend. The team arrived sometime between 6.15-6.30 as did Dr Bradley who was the on call G.P anaesthetist. At about 7.10 a.m. Mr Gibson was intubated and placed on a ventilation machine. Dr Bradley said he thought it was likely that Mr Gibson's unconsciousness was due to carbon dioxide narcosis. It could also have possibly been due to his very high sodium levels.

12. Dr Bradley was required to attend theatre to carry out anaesthetic duties and the hospital's anaesthetist who was a full time visiting medical officer, Dr Tyson tended to Mr Gibson. Dr Tyson discussed his case with Dr Duchow and it was determined that Mr Gibson should be transferred to Lismore Base Hospital as it was a tertiary hospital which could offer specialist ICU support and management. Dr Tyson noted that Mr Gibson was hypotensive (low blood pressure) and that the propofol he was receiving could make his blood pressure fall further. Accordingly, Dr Tyson changed the medication to morphine and midazolam to keep Mr Gibson unconscious whilst on the ventilator and arrival at Lismore. He also decided to insert a Central Venous Line so as to provide an additional stable means of venous access should Mr Gibson require further medication (including, for example, noradrenaline in case of a cardiorespiratory collapse).

The insertion of the Central Venous Line and transfer

13. Dr Tyson inserted a central venous line and he called for an x-ray to check that the position of the tip was not likely to cause a pneumothorax (a collapsed lung) and was not too close to the heart atrium (so as not to cause any cardiac fibrillation).

14. Unfortunately, the central line had been placed into Mr Gibson's carotid artery rather than his jugular vein. This error was not identified until 36 hours later by which time Mr Gibson was in the ICU at Lismore Hospital and a number of medications and maintenance boluses, including one containing a 50% dextrose solution had been delivered by the central line.

15. Mr Gibson was received at Lismore ICU at about 2 pm. Dr McCalman, Intensive Care Specialist at Lismore Base Hospital ordered a chest X- ray to ensure that both the endotracheal tube was still appropriately in place and that the CV line did not have any complications that might cause pneumothorax or cardiac afribillation.

16. Notably, Dr McCalman gave evidence that a chest x-ray does not have to ability to prove or disprove that a CV line has been inserted into a particular blood vessel i.e. a vein or artery.

17. Dr McCalman said he assumed that the Central Line had been placed in the correct vessel - that is, the internal right jugular – and after checking the placement of the tip by reference to the x-ray, directed his staff that medication and maintenance fluids infusion should be commenced. The treatment was directed at correcting Mr Gibson's electrolytes, particularly his elevated sodium levels, providing supportive care, assessing his clinical state and, should he regain consciousness, assessing his neurological function.[5]

Discovery of the Central Venous Line

18. Registered Nurse Dodds commenced his shift on 28 June 2011 at 1.30 pm. At about 3 pm he was allocated the care of Mr Gibson. He decided to attempt to determine Mr Gibson's fluid status. Part of that attempt involved taking measure of the central venous pressure by connecting a pressure cable between the line and a transducer for 5 minutes. When RN Dodds read the trace reading from the traducer, he saw waveforms suggesting that the line had been incorrectly placed in an artery (arterial waveforms are strong and steep compared to venous waveforms, which are distinctly smaller and softer).

19. RN Dodds informed the in-charge nurse, the Resident Medical Officer and the on-call Intensivist. He then took a blood sample from the Central line and performed a blood gas test. This test showed that the sample was arterial blood. The intravenous infusions were stopped, but the line remained in place in case its removal caused bleeding as Mr Gibson was receiving heparin, an anti-coagulant. RN Dodds then completed an incident report.

[5] Dr McCalman Statement Brief of Evidence Vol. 1 Tab 17.

20. In his statement, Resident Medical Officer Dr Jonathon Kavanagh-Patel said Mr Gibson had been receiving propofol, insulin, glucose, vitamin K and pantoprazole via the central line. The notes of Dr Hong also reflect this.

21. When Dr McCalman commenced his shift on the morning of 29 June 2011 he was advised of the discovery that the CV line was in the carotid artery. He spoke with Mr Gibson's family and advised them of the situation and that there was an increased risk of brain injury because of the misplaced CV line.

22. On 29 June a CT scan of Mr Gibson's brain showed features consistent with right sided brain infarction. Dr McCalman in his evidence explained this damage was consistent with the damage to be expected as a consequence of the fluids being conveyed via the carotid artery directly to the brain. He explained that the change of viscosity and molecular or chemical structure associated with such an infusion was such that it could cause occlusion in arteries in the brain, thus preventing the flow of blood, and the necessary oxygen and nutrients to the brain.

23. Lismore hospital staff determined that Mr Gibson had suffered catastrophic irrecoverable brain injury. After consultation with his family, he was provided palliative care until his death on 3 July 2011 at Lismore Hospital.

Evidence taken during inquest

24. The Brief of Evidence contains statements, documents and records in relation to medical and nursing staff that treated and managed Mr Gibson from 24 June to 3 July 2011. It also contains his medical history from his General Practitioner. An expert report prepared by Dr John Roberts has assisted in identifying issues in relation to Mr Gibson's health, treatment and death. I have heard oral evidence from a number of people including Dr Duchow, treating surgeon, Dr Bradley on-call GP anaesthetist, RN Pinkowski, Dr Tyson, Grafton Base Hospital visiting medical officer anaesthetist, Dr McCalman, Intensivist Specialist, Lismore Base Hospital, RN Dodds of Lismore Hospital. After their evidence I heard evidence from Dr Roberts and lastly evidence from Mr Dan Madden, Executive Officer of the Local Area Health District.

25. Mr Gibson was the eldest of child of 4 children and his eldest sister Gina Francis attended this Inquest. She made a statement at the conclusion of the evidence reminding us that her brother John was not just a patient with a mental illness and alcohol and cigarette addiction but a much loved member of his immediate and extended family and of the Grafton community. She described his life and his nature and she believed he was frightened in the days prior to his death. Indeed, he remarked to friends visiting him in the afternoon of 26 June 2011 that he might not be coming home.

26. This Inquest in considering manner and cause of Mr Gibson's death has heard much evidence about Central Venous Lines and has examined whether the misplacement of the line in Mr Gibson's case can be said to be the cause or the significant cause of Mr Gibson's death and, if so, by what mechanism. Given Mr Gibson's likely difficulties upon having surgery, consideration was also given to the necessity and appropriateness of having surgery at Grafton Base Hospital on 24 June 2011 as opposed to being transferred to the Lismore Base Hospital.

27. The Inquest has also involved the consideration of whether Mr Gibson was monitored appropriately at Grafton Base Hospital and whether the response to his deterioration was appropriate and whether the decision to transfer Mr Gibson to Lismore Base Hospital was made in a timely manner.

28. In terms of the insertion of the Central Venous Line, the inquest has considered whether the appropriate checks were made at Grafton Base Hospital to ensure it was in the correct vessel. I have considered whether the placement of the Line should have been checked at Lismore Base Hospital upon his arrival. Finally, I have considered the adequacy of training at the Northern NSW Local Health District in relation to the placement and checking of Central Venous Lines.

Dr Tyson's evidence

29. Dr Tyson has made a statement and given evidence. He described an extensive history of anaesthetics practice following 6 years of training at St Vincent's Hospital Sydney. He did not pass his examinations to become a specialist anaesthetist and Fellow of the Australian and New Zealand College of Anaesthetics after declining to resit- his

examinations in 1995. His training, however, is such that he is a member of the College. Since approximately 1995, his sole occupation has been to serve Visiting Medical Officer at Grafton Base Hospital performing anaesthetic duties.

30. Dr Tyson says he has been inserting CV lines since 1983, performing on his estimate 6-8 per month. Dr Tyson described how he performs the placement of a CV line into the internal jugular in the side of the neck of a patient such as Mr Gibson. He stated that he employed a technique using landmarks to identify the correct vessel. He firstly inserts a fine gauge needle and using that as a guide he inserts a wide bore gauged needle alongside it into the vessel. He then removes the fine gauge needle completely.

31. Then it is time to attach the wire for the CV Line by removing the syringe from the needle and attaching the wire which is then fed through the bore bringing the 3 lumen line with it. Once it is place, as I understand it, the line is about 5 cm in the vessel. Dr Tyson then removes dilates the line removes the wire and flushes each of the 3 lumens of the line.

32. Dr Tyson gave evidence that due to the high pressure of an artery, if a CV line is placed into an artery, even at the commencement of using the small gauge needle, blood pulsates out of it. It would also pulsate at other points of his procedure (though perhaps not as strongly) including when inserting the wide bore needle, removing the syringe from that needle and at each flushing of the respective lumens of the line. He said that if such a thing occurs it is an indication that the carotid artery rather than the jugular vein is involved. He relied on the absence of pulsating blood as confirmation that he was not in the artery. He said he also relied on the colour of the blood describing that it was dark – if it had been arterial blood it would have been bright red.

33. Dr Tyson said in his statement that he ordered a chest x-ray and he used that to confirm that the CV line was in the internal jugular vein. He said that he undertook all checks that could reasonably be done and expected to be done at the time and there was nothing during the procedure that suggested that the line was in an unsatisfactory position.

34. Dr Tyson concedes that he had inadvertently placed the CV line into Mr Gibson's carotid artery. In his evidence he initially posited that the only explanation why the

blood did not pulsate was because the opening of the needle might have been positioned on an angle and perhaps against the wall of the artery thus the opening was blocked preventing blood from exiting.

35. In examination by Mr Lynch he conceded that given that he would expect pulsating at each of the 5 stages as described by him, for that explanation to hold true the openings of each of the small needle, the wide bore needle and the end of the line would at all times be against the wall preventing blood flow. He agreed that his was unlikely and not a realistic explanation.

36. Mr Lynch asked Dr Tyson if Mr Gibson's blood pressure could have been so low that there was no noticeable pulsate from the punctured artery. Initially Dr Tyson remarked that a blood pressure of 85/50-55 was such that he would still expect there to be good enough flow for it to pulsate. Later, when it was pointed out that Mr Gibson was hypotensive enough for him to change the medication he conceded that Mr Gibson's blood pressure could have been so low that there was no pulsation at the time he inserted the line but he couldn't say what his blood pressure was at the relevant time because during the procedure he had his back to the monitor.

37. Dr Tyson ultimately agreed that low blood pressure was by far a more likely explanation rather than the explanation he initially put forward and was unable to explain why he had not proffered it. When Dr Roberts was asked about the 85/50 blood pressure he articulated quite readily that such a blood pressure, particularly for a person with a history of hypertension (such as Mr Gibson) indicated that his body was in shock and a pulsating blood flow would be unlikely if the carotid artery was punctured.

38. Dr Tyson did not conduct any other check (such as transduction or blood gas assessment) to confirm that he had placed the CV line into the correct vessel. He says that there was no reason to conduct any such check because relying on the colour of the blood and the lack of pulsatile indicated to him that he positioned the line correctly. I would think that there is no circumstance other than perhaps an emergency or a particular surgical procedure preventing such additional checks from being made. RN Dodds said that the Lismore ICU have been carrying out such additional checks since about 2007-2008.

39. It has been identified in these proceedings that blood colour is an unreliable means of assessing whether blood is venous or arterial blood. Further, it appears clear from the evidence that where a patient has hypotension, checking by reference to the absence of pulsatile flow can be unreliable.

40. The transducer is traditionally used to measure central pressure and its use for that purpose is now no longer indicated however the transducer distinguishes venous wave form and arterial wave forms. Following Mr Gibson's death, the Northern NSW Local Health Network's Medical Quality Committee recommendation that "all central lines put in at the Grafton Base Hospital should be transduced". This recommendation was conveyed to Dr Jean Collie, Medical Director of Grafton Base Hospital by letter of 1 December 2011[6].

41. Dr Tyson said that in 2011 he was aware that he could check that the correct line was in the correct blood vessel by using either or both Air Blood Gas test and/or the Transduction test but did not consider either necessary as he was confident he had placed the CV line correctly.

42. At the time in 2011, the Grafton Base Hospital engaged 2 General Practitioners to perform Visiting Medical Officer anaesthetic duties. Dr Bradley was one and the other was a Dr Lever. In 2010 the hospital an ultrasound machine which, among other things, was available to assist in the placement of a CV line. Both Doctors Bradley and Lever had attended education courses at the suggestion of Grafton Base Hospital and had been using that method during 2011.

43. Dr Tyson had not attended the course and did not use the ultrasound method. Though the NSW Health Policy requires staff to engage in educational training, Visiting Medical Officers are not considered "staff" for that purpose so do not fall within that policy mandate. However, since Mr Gibson's death, Dr Tyson has completed the ultrasound training. In evidence he stated that he now performs CV line placement with the use of an ultrasound and also conducts a proper check to confirm placement in the correct vessel.

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[6] Tab 16A.14 Vol 1 Brief of Evidence

44. Whether the Central Line placement by ultrasound is preferred to using the landmark technique is not a matter for this Inquest but given the apparent lack of sufficient ultrasounds at every time and place where a CV line is required to be placed, it seems to me that the skill to place a central line without the use of an ultrasound is still required.

45. Irrespective of which method is used to place a CV line, it is essential that appropriate checks are undertaken to confirm correct placement. Correct placement includes the consideration of two particulars of the line. The first relates to where the tip or end of the line sits in relation to the heart or lung. The second relates to where the line is placed in relation to the blood vessel that is a vein rather than an artery. The first is checked by chest x-ray. The second is best checked by manometry, ultrasound, transduction or image intensifier. This is incorporated into the NSW Health Policy Directive PD2011_060, entitled "Central Venous Access device Insertion and Post Insertion Care was published on 20 September 2011[7].

46. Inquests are not conducted to cast blame on persons and Dr Tyson at no stage has attempted to distance himself from having placed the CV line into the artery. I accept it was inadvertent. Nevertheless, to comply with best clinical practice regardless of whether it is driven by policy or not, the line should have been checked by reference to something other than the presence or absence of pulsatile flow. It is unfortunate that the HDU at Grafton Base Hospital had not adopted the practice to check placements which Lismore ICU had been employing since 2008.

47. In relation to the verification of line placement following transfer, I note that Dr McCalman gave evidence that since Mr Gibson's death, whenever he receives a patient with a Central Line already in situ he presumes that it is incorrectly placed and does not use the line to administer medication until the proper checks are made. I consider that this is an appropriate approach.

[7] Tab 35 Vol 2 Brief of Evidence

Policy Changes

48. Mr Dan Madden, the Executive Officer of the Northern NSW Local Health District wrote a report [8] and gave evidence that an audit at Grafton Base Hospital in January 2014 confirmed that the practice to check central line placements by transduction is uniformly practiced. He also said that since Mr Gibson's death changes have been made at the High Dependency Unit including the engagement of a full time VMO Director in December 2012. His report also sets out the improvements of clinical practice resulting from the implementation of the NSW Health Policy known as "between the flags" commenced in April 2011.

49. NSW Health Policy Directive PD2011_060, entitled "Central Venous Access device Insertion and Post Insertion Care" was published on 20 September 2011[9]. All hospitals in NSW are required to comply with this policy. Accompanying the introduction of this policy was the new medical record entitled "Central Venous Line Insertion Record" which the medical practitioner is required to complete. It includes a section "Venous placement confirmed" which includes the type of method used to confirm venous placement, specifically "manometry, ultrasound, transducer or other". Clause 21 of the policy mandates that the document is to be completed by the practitioner and placed in the hospital file. Notably, the policy does not mandate confirmation of venous placement.

50. Clause 21 of the policy is entitled "Confirmation of Venous Access" the purpose purports to avoid the risk of "potentially damaging a major artery with the dilator". There is no reference to the need to minimise the grave risks associated with infusing fluids into the incorrect blood vessel. Clause 21 says that the clinician inserting the CVAD **should** confirm that the guidewire is in a vein by manometer, transduction, ultrasound or blood gas analysis. A later clause 15 is entitled "Confirmation of Central Venous Access Device Placement". This relates to the use of a chest x-ray to confirm the tip placement relative to the heart and lung. It does say "Prior to this, other methods **may** be used to confirm venous placement (e.g. manometry, ultrasound, transduction, image intensifier)".

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[8] Tab 16A.1 Vol 1 Brief of Evidence

51. I have highlighted the words "should" and "may" in clause 21 and 15 respectively to indicate that the NSW Health Policy does not clearly say that the practitioner *must* confirm venous placement. Mr Madden said that such confirmation is mandated in Grafton Base Hospital and relies on the letter from the Quality Medical Committee of 1 December 2011. In his evidence he confirmed that the recommendation that "all central lines should be transduced" has never been formally adopted at Grafton Base Hospital and that it need not be now as the practice has been adopted as evidenced by the results of an audit in January 2014.

52. Mr Madden's report identifies that the Grafton Base Hospital audit of January 2014 shows 100% compliance with venous placement checks by ultrasound or transduction. This is an improvement on the 70% compliance in 2012 and the 74% compliance in 2013 (despite the December 2011 Quality Committee's mandate and September 2011 NSW Policy implementation. (Of concern, the same graph shows only 88% compliance in 2014 and less than 60% compliance in 2012 and 2011 of the policy that practitioners should check the CV Line tip position confirmation by x-ray).

53. Mr Rooney, for the Northern NSW Local Health District, in submissions reminded me that as NSW Health is not a party to these proceedings I would refrain from making any comment or recommendations in relation to the NSW Policy. He observed further that any policy of the Northern NSW Local Health District must be consistent with the NSW Policy. I do not know why the Quality Medical Committee 2011 recommendation was not adopted into Northern NSW Local Health District policy as it is not inconsistent with NSW Policy.

54. It would seem that given that the audit examined compliance by way of ultrasound or transduction that the recommendation that "all central lines should be transduced" has not been adopted in any event. The data does not distinguish between the use of ultrasound to position and confirm placement of the line and the use of a transducer to confirm placement so I am unable to determine what the practice actually is at Grafton Base Hospital.

55. As I said earlier, what is important is that when a Central Line is placed, it must be checked in accordance with one of the methods considered above to confirm that it is in a vein and not an artery before it is used to infuse substances into a patient. Given

the potentially serious consequences (i.e. likely death or grievous injury) I cannot think of any reason the requirement is not mandated, save for where it is not practicable due to emergency or surgical requirements.

56. The Northern NSW Local Health District should ratify a policy that ensures that practice is formally adopted at Grafton Base Hospital – it is a practice that has been occurring at Lismore ICU since at least 2008 and it is a policy that is not inconsistent with that of NSW Health because even though the policy does not mandate the line confirmation checks, the completion of the "Central Venous Line Insertion Record" *is* mandated and that form contemplates confirmation of venous placement.

Findings regarding issues

57. In relation to the issues in this Inquest, I find that though Mr Gibson was in generally poor health to undergo major surgery, the medical condition he presented with on 24 June 2011 required urgent and lifesaving surgery and accordingly it was necessary and appropriate that Mr Gibson have that surgery forthwith at Grafton Base Hospital. His surgery was performed competently by a capable surgeon. Further, the surgeon Dr Duchow correctly identified his medical needs in circumstances of poor respiratory function and alcohol withdrawal syndrome. She conveyed correct instructions for his nursing care. Mr Gibson was monitored appropriately by nursing staff and his nursing care was carried out competently with an appropriate response to his deterioration.

58. However, there was a significant period of 30 minutes before a BiPap machine was located and delivered to the HDU. A patient in critical care, suffering respiratory distress and in need of urgent ventilation, such as Mr Gibson, should not suffer the risk of or actual hypoxia due to a lack of ventilators in the HDU. According to Mr Madden's evidence, the hospital has since acquired sufficient ventilators for the HDU. The decision to transfer Mr Gibson to Lismore Base Hospital after his respiratory collapse was made in a timely manner.

Cause of death

59. Mr Rooney has sought a finding of cause of death that effectively does not distinguish between the brain injury caused by the infusions administered via the misplaced central line and the medical deteriorations that caused Mr Gibson's collapse on the morning preceding his transfer to Lismore ICU.

60. Mr Lynch submits that though, on the evidence of Dr John Roberts, Mr Gibson had only about a 50% chance of survival or recovery from those conditions, it cannot be said that Mr Gibson's pre-existing conditions were the cause of his death. Instead, he submitted that the evidence overwhelmingly supports a finding of fatal brain injury.

61. Dr McCalman said that Mr Gibson's brain damage was likely caused by the incorrect insertion of the Central Venous Line. He posited that this occurred in one of two ways:

    a. clots which form around the site of the line entry travelled into the brain, causing blockages; and/or

    b. the infusions themselves resulted in the damage.

62. Accordingly, I am satisfied on balance of probabilities, that the cause of death is the brain injury caused by inadvertent misplacement of the central line into the carotid artery.

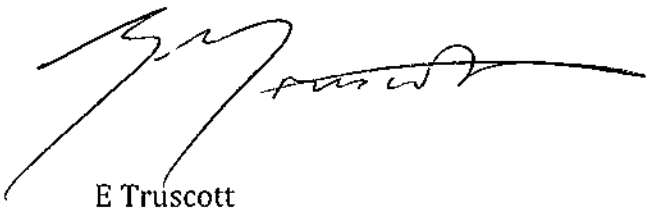
Formal finding and recommendation

63. My formal finding is as follows:

    John Gibson died 3.50 p.m on 3 July 2011 at Lismore Base Hospital Lismore of right cerebral infarction caused by the infusion of medication between 27 and 28 June 2011 via a Central Venous Line inadvertently inserted into the Carotid Artery at Grafton Base Hospital at about 8 a.m. 27 June 2011. Prior to insertion of the Central Venous Line Mr Gibson was already suffering from respiratory depression (including carbon dioxide narcosis), hypernatremia and alcohol withdrawal syndrome following an emergency laparotomy and right hemicolectomy whilst he had Nephrosclerosis, Liver Cirrhosis and Chronic Obstructive Pulmonary Disorder (emphysema and atelectasis) from a long history of smoking tobacco.

64. Given the changes that have already been implemented at Grafton Base Hospital I make one recommendation as follows:

That the Northern NSW Local Health District introduce a policy mandating that practitioners confirm venous placement of Central Lines consistent with the Medical Quality Committee advice to Grafton Base Hospital on 1 December 2011 and the NSW Health Policy Directive PD2011_060.



E Truscott

Deputy State Coroner

16 March 2015