CORONERS COURT
OF NEW SOUTH WALES

Inquest:	Inquest into the death of Alexander Costello
Hearing dates:	22, 23 & 24 October 2018 at Gunnedah
Date of findings:	9 November 2018
Place of findings:	State Coroner's Court, Glebe
Findings of:	**State Coroner Les Mabbutt**
Case number:	2016/110827
Catchwords	CORONIAL – Hospital Care and Treatment. Clinical use of NSW Health "Chest Pain Pathway".
Representation:	Coronial Advocate Assisting the Coroner Mr S Kelly Mr I McGillicuddy instructed by Beilby Poulden & Costello for the family of Mr Costello Ms L McPhee instructed by MDA National for Dr Gittoes Mr S Kettle instructed by Hickson Lawyers for Hunter New England Local Health District Ms L Toose for RN Sullivan

Introduction

1. On Saturday 9 April 2016 around 1.50pm Mr Alexander Costello arrived at the Emergency Department (ED) at Gunnedah Hospital. Alex had been driven from the local football fields to the Hospital by Mr Raymond McCoy. Alex was suffering severe chest pains. Alex was admitted and seen by Dr Christopher Gittoes a general practitioner, the only doctor in the ED that day. Over the next six and a half hours various tests and examinations were conducted. Dr Gittoes considered several diagnosis, eventually deciding Alex was suffering from gastritis. That evening Alex was admitted for overnight observation and transferred to a general ward. At about

8.30pm whilst in the shower Alex collapsed. All efforts to revive him were unsuccessful. Alex was pronounced deceased at 8.55pm. Alex was 37 years old.

Cause of death

2. The cause of Alex's death at the time was unknown. His death was reported to the Coroner. A Post Mortem was conducted at Newcastle Department of Forensic Medicine on 14 April 2016 by Dr Hannah Estub a Forensic Pathology Registrar. The Post Mortem found a large haemopericardium (blood in the pericardial sac of the heart) secondary to an aortic dissection (the tracking of blood within the walls of the aorta, secondary to a tear in the inner lining of the vessel).

3. Alex had suffered a Type A aortic dissection causing a rupture of the aorta into the pericardial sac causing tamponade (compression of the heart due to a build up of fluid in the pericardial sac). There was a tear in the aorta of 36mm commencing at the aortic root and extending down the entire aorta, including the iliac arteries (pelvis area).

Why was an inquest held?

The role of the Coroner pursuant to s 81 of the *Coroners Act* 2009 is to make findings regarding:

- The identity of the deceased
- The date and place of that person's death
- The cause and manner of that person's death

4. An inquest was held to examine the care, treatment and diagnosis Alex received at Gunnedah Hospital. Further, should Alex have been transferred to another hospital earlier and was Alex's death preventable?

5. Pursuant to s 82 of the Act, a Coroner has the power to make recommendations, including concerning any public health or safety issue arising out of the death in question.

Background

6. Alex was born in Sydney and grew up on the Gold Coast with his parents Peter and Dianne and his older sister Charlotte. Alex completed his schooling at

Rockhampton and graduated with a Bachelor of Education and Physical Movement from Cairns.

7. Alex played Rugby Union most of his adult life, having played, captained and coached the James Cook University Mariners whilst in Cairns. In 2002 Alex commenced a relationship with Emma and they travelled around Australia together. In 2008 their first child Rochelle Dianna was born in Cairns. Alex and Emma were married in September 2009. Another child Blaire Tracey Louise was born in January 2011. The family moved back to Gunnedah that year. Alex continued his involvement with Rugby in Gunnedah. A third child Harper Charlotte Anne was born in January 2013. Alex was employed at Whitehaven Coal as a driver then a driller.

8. Alex was heavily involved in local sports at Gunnedah. Alex was rarely ill and did not attend doctors on a regular basis. He had to undergo a mandatory health assessment at Whitehaven Coal every three years. Alex's father had survived an aortic dissection and in 2012 a cousin aged 35 died from the condition. Alex was told to see a cardiologist about this issue. He attended a GP and was informed he should ensure his blood pressure was monitored. Alex did not consult a cardiologist.

Events leading up to the death of Alex

9. Alex was a regular drinker and would consume about 4-6 stubbies of beer frequently. That depended on what shift he was working given the mandatory alcohol and drug testing that took place at work. On Friday 8 April 2016 the family went to a friend's house to watch the football. Alex drank about 10 stubbies of beer.

10. On the morning of Saturday 9 April 2016 Alex woke up and ate some cold pizza for breakfast. At 9.30am he took the children down to the football fields to assist in setting up the ground for the games that day. Alex was looking forward to catching up with friends, having a few drinks and watching the football. He returned at about 9.30am did some chores and returned back to the football field at 11.30am. Emma remained at home. Apart from a bit of a hangover, Alex had not complained to Emma about any pain.

11. Alex knew many people at the football. At about 1.20pm he walked up to his brother in law Paul Wicks and grabbed his chest with one hand. Paul observed Alex change colour to pale grey. Alex dropped to one knee. An off duty nurse saw Alex and said he was having a heart attack. Given the proximity of the hospital and any delay in

calling an ambulance, Mr Raymond McCoy drove Alex immediately to the hospital. On the trip in the car it was obvious to Mr McCoy that Alex was in severe pain. Alex had lost all his colour, was sweating profusely and was holding his chest. Upon arriving at the Emergency Department (ED) Mr McCoy raced in and called for assistance.

Admission to the ED

12. RN Sullivan was on duty in the ED. Alex was put in a wheel chair and taken straight through to the ED. Alex was in terrible pain. RN Sullivan conducted a quick assessment at 1.55pm and triaged Alex as a Category 2. Dr Gittoes attended on Alex a few minutes later. The ED was busy that day. Dr Gittoes was the only doctor. There were already several patients in the ED and a number of people waiting to be seen by a doctor. Both Doctor Gittoes and RN Sullivan considered Alex was the most serious case. Dr Gittoes conducted an examination of Alex and recorded his notes of that examination in the progress/clinical notes some time later given how busy the ED was and the immediate need to stabilise Alex.

13. RN Sullivan asked Alex a few questions but did not recall what was said regarding any family history of heart disease. She did not record anything in the notes on this issue. Given Alex's presentation RN Sullivan commenced the use of the "Chest Pain Pathway"(CPP) which is a NSW Health Policy that provides a guide by way of a four page flow chart for diagnosis, treatment, management, risk classification and review for patients presenting with chest pain. A blood sample was taken to test for troponin, a standard procedure that indicates damage to the heart muscle, signifying a person has suffered a myocardial infarction (heart attack). RN Sullivan conducted an ECG at 2.03pm and again at 2.06pm. Both ECGs were normal.

14. Dr Gittoes and nursing staff spent approximately 30 minutes attempting to address Alex's level of pain and diagnose his condition. During this period Dr Gittoes conducted an examination of Alex and recorded the following notes:

37 year old male
P/C Chest pain
R loin pain
Diaphoretic and nauseous
R lateral leg numbness.

Pain commenced 1 hour ago
Nil predisposing/causal factors
Normally well
Nil mediations
Nil known allergies
ETOH (alcohol) 10 std per day
Denies other substance abuse

15. Dr Gittoes also recorded Alex's medical observations that had been taken by the nurses. He examined Alex's abdomen and excluded any possible Abdominal Aortic Aneurism. Given Alex's severe pain and initial high blood pressure, Dr Gittoes prescribed morphine and later maxolon, buscopan, metoclopramide and anginine (for angina heart pain).

Conversations regarding Alex's family medical history

16. RN Sullivan left the ED at 2.30pm and did a hand over with RN Mainey. As RN Sullivan left she saw Emma still in the waiting room. Some time after 2.30pm Emma went into the ED and saw Alex on the bed in considerable pain. There were 3-4 nurses around the bed with Dr Gittoes. Alex was anxious, sweating, swearing and clearly not his usual self. She was told they were just getting Alex's pain under control.

17. Conversations took place between Emma, Alex, Dr Gittoes and RN Mainey. There are several versions of what was said and to whom regarding Alex's family history of heart conditions.

18. There are no notes recorded by Dr Gittoes of any family history. Dr Gittoes fairly conceded in evidence that he could not recall exactly what was said at a particular time but recalls a mention from someone of a cousin, but he considered it fairly non specific and did not make a record of any adverse family history in the notes.

19. Emma stated she said Alex had a history of a heart condition, a nurse responded "OK". Emma states she mentioned a burst artery to one of the nurses. She then asked Alex if he had told them. Alex responded "*I've told them everything*" She noted Dr Gittoes was at the bedside taking notes. Emma asked if they were transferring Alex to another hospital and was told nothing was showing up on the

ECG. Emma distinctly remembers Dr Gitoes asking her if she knew the name of the condition, however she replied *"no I just know they drop dead".*

20. RN Mainey recalls Emma arriving and telling her about a family history. Emma mentioned a dad and cousin but she did not recall any mention of a burst artery, but some form of heart disease. RN Mainey did not record anything in the notes as she considered Dr Gittoes had already completed a full history and any heart attack would likely show up on the ECG. She could not recall if she passed on that information to Dr Gittoes but recalled discussing it with Alex but had no memory of a cousin dropping dead of a heart attack.

21. Shortly after 4pm Emma's sister Michelle Wicks attended ED. Dr Gittoes came in and advised the tests were all clear. There was a further discussion about the family history of a heart related condition. A decision was made to call Alex's mother Dianne to find out more specific information about the nature and name of the condition as no one could put a name to the condition. Attempts to call Dianne were unsuccessful.

22. Determining what was actually said to medical staff by Alex, Emma and Michelle presents several difficulties. No record was made by staff of any of these conversations. All witnesses had to recollect what took place over 2 and half years later. For Emma and Michelle these conversations took place in very distressing circumstances. I found both Emma and Michelle honest witnesses, both conceded in evidence that at the hospital on that date they were not familiar with the term "aorta". The recollection of medical staff is also affected by involvement with other patients and family members in the intervening period.

23. I find that Alex, Emma and subsequently Michelle conveyed to the medical staff information that there was a history of a heart condition in Alex's family. The word "aorta" was not mentioned. I find that Emma mentioned the term "artery" to a nurse, but not directly to Dr Gittoes. I am unable to find which nurse was specifically told this. In any event I find this information was not passed on. It is also apparent from the evidence that tragically at the time Alex, Emma and Michelle did not know the specific name of the condition. The attempt to ring Dianne confirms that.

24. That is not a criticism of Emma or Michelle who were gravely concerned with Alex's condition. As indicated by Associate Professor Holgate who was called later in the

proceedings, it is a regular occurrence for doctors to be told about a family history of heart problems by a patient but the patient and/or family are unable to provide the name of the exact condition. Associate Professor Holgate considered information about what exact relative and the age of any relative/s who had suffered from a heart condition is the critical information to be obtained in those circumstances.

25. Regrettably given the failure by Dr Gittoes or the nurses to properly record any of this information it was not considered fully in any diagnostic decisions.

Was the treatment, monitoring and diagnosis provided to Alex at Gunnedah Hospital reasonable and appropriate?

26. Dr Gittoes is an experienced general practitioner. Since 2005 he has participated in the Gunnedah hospital emergency department on-call roster. It must be borne in mind the Gunnedah hospital ED unlike other hospitals at major regional centres or in major cities does not have emergency specialists and is staffed by local general practitioners. Dr Gittoes was not required to complete the type of specialist training that is undertaken by ED specalists at larger hospitals. He was by himself that afternoon in a very busy ED. Without the services of local GPs the ED would be unable to operate. What many other clinicians would take for granted in most hospitals, CT scanning, MRI imaging and consultants/specialists are not available at Gunnedah.

27. Dr Gittoes had available to him the ability to consult by phone medical specialists at Tamworth Hospital, a normal practice for regional doctors. Dr Gittoes gave evidence which was not in dispute, that he has a low threshold in requesting advice from and transferring patients to Tamworth Hospital.

Clinical decisions made by Dr Gittoes

28. Alex's first blood pressure reading was 180/85 which was consistent with RN Sullivan recording Alex's pain level at 10/10. Alex was administered morphine. The CPP was followed by RN Sullivan then RN Mainey, Alex was given pain relief, ECGs, IV access, aspirin and had the appropriate blood tests. Dr Gittoes did not conduct a chest X ray.

29. Alex's next pain level recorded was at 2.55pm of 8/10. It had dropped to 4/10 by 3.15pm. Results of the troponin tests were provided by pathology at 3.07pm (it is unknown exactly when Dr Gittoes saw them). They were negative. Dr Gittoes

considered the normal ECG and the negative troponin test did not point to a myocardial infarction. He was then considering several differential diagnosis, his notes stated:

AMI but normal ECG
Renal Calculi
Pancreatitis/GORD
Psoas abscess but afebrile
Small bowel-appendix
Diverticular

30. At 4pm Alex's pain level's had increased back to 7/10. Dr Gittoes was advised and attended to review Alex, about that time Michelle Wicks attended the ED. Dr Gittoes ruled out myocardial infarction based on the ECG and troponin results. Regrettably all the notes made by Dr Gittoes during the period Alex was under his care do not have any specific times recorded. It is easy to understand in the early stabilisation phase that notes may not be fully completed. However Dr Gittoes did not write any times on any of his subsequent entries. That resulted in a lack of clarity from the notes regarding specifically when clinical decisions were made by Dr Gittoes.

31. Dr Gittoes stated if he had heard the word "artery" in any discussion on family history he would have turned his mind to an abdominal aortic aneurism (which he stated he had examined for already and discounted). Dr Gittoes considered the most likely diagnosis was Gastritis. He was of the view that Alex's condition was improving and stabilising based on the observation charts and other clinical information. It is clear from the evidence that Dr Gittoes took into account in considering differential diagnosis the amount of alcohol Alex reported drinking the night before.

32. Alex had mobilised to go to the bathroom and Dr Gittoes considered that and the fact Alex elected to walk to the ward rather than travel in a wheelchair was significant. Dr Gittoes had turned his mind to whether transferring Alex to Tamworth was required throughout the afternoon. However, Dr Gittoes's view of a clinical improvement resulted in him not considering it necessary to contact Tamworth.

33. Dr Gittoes accepted the numbness and pain in Alex's right leg and right loin area was not consistent with a diagnosis of gastritis. However he considered that symptom had improved (given Alex's mobilisation) and he had excluded cardiac issues from his diagnosis.

The Chest Pain Pathway (CPP)

34. The CPP flowchart on page 1 of 4 stipulates that following consideration of the ECG and other vital signs the pathway proceeds to ST elevation (inconsistencies in the ECG). Where no ST elevation is apparent, the next clinical consideration by way of arrow moves down to the third box in the middle column. That box states *"Consider Aortic Dissection (back pain, hypertension, absent pulse, BP difference)."* Also in the same box is pulmonary embolism.

35. Dr Gittoes stated he had never been specifically instructed to use the CPP and does not recall ever signing or filling one in. He was well aware and had experience of the clinical pathway to follow regarding presentations of chest pain. Page 2 of 4 of the CPP had Alex rated low risk with the name of Dr Gittoes written in. The low-risk box on page 2 requires a clinical re-stratification if there is recurrent ischemic chest pain. RN Mainey completed the CPP that was placed in Alex's medical file. Dr Gittoes does not remember looking at it on the day.

36. Dr Gittoes stated whilst he was aware of the symptoms of an aortic dissection, it is very rare in a young man and he had never seen a presentation of aortic dissection in all his years of practice. In his view Alex was stabilising and improving and for that reason he did not ring Tamworth or consider transporting Alex to Tamworth. Dr Gittoes did not consider aortic dissection as a possible diagnosis. He considered Alex's blood pressure was normal as was his oxygen saturation levels.

37. From about 2.30pm onwards with the exception of going home briefly around 5.30-6pm Emma spent all of those hours with Alex. Alex continued to complain to her about chest pain, back pain which prevented him from lying back properly on the bed and he vomited and dry retched several times. His mobilisation attempts to go to the toilet and to walk to the ward were undertaken with real difficulty. Emma stated Alex was physically exhausted. Upon being transferred to the ward Alex still looked ill and threw up again. Alex's brother in law Paul Wicks rang at 8.12pm and spoke with Alex who said *"I've got bad chest pains. It hasn't improved. They keep*

telling me it's my pancreas or gallstones but I keep telling them it's up here in my chest". At that stage Alex had been in hospital for over six hours.

38. Dr Gittoes, due to other demands, was not by Alex's bedside the whole time. Neither were the nurses. Clearly the ED was busy, however all the evidence demonstrates that Alex's condition had not improved. The recorded pain level are consistent with Emma's observations, they are:

4pm	*7 (in the yellow zone)*
6pm	*5*
7.10pm	*5*
7.30pm	*6*

Expert Evidence

39. Associate Professor Vincent Roche has extensive experience as a rural GP and a visiting medical officer at Bowral Hospital for 29 years. Associate Professor Roche considered the notes taken by Dr Gittoes and his examination of Alex were adequate and comprehensive. In his opinion taking into account the nature of Alex's presentation, the rare nature and difficult diagnosis of aortic dissection and realities of practice at Gunnedah, Dr Gittoes did a very good job in the circumstances not being a highly trained emergency physician.

40. Associate Professor Roche does not utilise the CPP chart. He considers it does not replace independent clinical thinking. In his view experienced clinicians are not required to look everything up however the CPP is useful for inexperienced medical staff. He conceded gastritis did not explain all the symptoms present on the day. Associate Professor Roche also was of the view hindsight bias is a factor to consider in critically viewing Dr Gittoes's action on the day. Associate Professor Roche did not consider the pain indicators ratings, being patient subjective, replaced normal objective observations. In all his years of practice Associate Professor Roche has seen one aortic dissection in an elderly patient.

41. Associate Professor Anna Holdgate has 23 years of clinical experience as a specialist in emergency medicine and is a Senior Staff Specialist in emergency medicine. She stated aortic dissections are very difficult to diagnose, are often missed and are only properly confirmed by a CT scan. Chest x-rays are not a reliable diagnostic test.

42. In her opinion the notes made by Dr Gittoes were insufficient and lacked detail regarding the history of the acute onset of Alex's pain, the specific nature of the pain and a thorough history particularly regarding any family history. Associate Professor Holdgate also does not personally use the written CPP given her experience. She stated the pathway is all about chest pain and stratification should only occur after all the differential diagnosis are considered. Aortic dissection, whilst rare was not considered in accordance with the pathway and was excluded by Dr Gittoes.

43. In Associate Professor Holdgate's opinion the time that Alex should have been reviewed given chest pain was continuing was at approximately 3.30pm. In her opinion, the importance of considering the diagnosis of aortic dissection is highlighted on the CPP. Alex's pain indicated something was going on coupled with the symptoms including the back pain. Whilst noting the particular circumstances and available resources Dr Gittoes had at his disposal and that not every patient can be transferred, she considered the diagnosis of gastritis was not reasonable and not consistent with all the symptoms.

44. Dr Peter Hansen is an interventional and consultant cardiologist based at Royal North Shore Hospital. Dr Hansen was of the opinion that aortic dissection should have been considered at an early stage even before the troponin results had returned after normal ECG tests. Dr Hansen was of the view that the overriding factor in Alex's presentation was he continued to have chest pain. That a presentation of that nature coupled with all the symptoms is either a heart attack or an aortic dissection.

45. In his view following a normal ECG, contact should have been made with a specialist in the circumstances of continuing chest pain. Dr Hanson stated not many conditions are consistent with the acute onset of pain, sweating, nausea, right leg pain, back pain, right loin pain and acute chest pain coupled with a normal ECG. Gastritis did not explain everything that was going on with Alex's presentation. Whilst it was reasonable to entertain differential diagnosis, he did not agree with all the ones that had been entertained.

46. The increase in pain levels again after the effects of the morphine had worn off at about 4pm should have caused concern as to what was causing the pain as it never settled. Dr Hanson did not agree the normal blood pressure and other objective observations recorded provided false reassurance to Dr Gittoes, the ongoing chest

pain was never resolved. Dr Hanson considered the overriding factor was that Alex continued to have chest pain. That Alex was continuing to dry retch and vomit anti emetics medication was another indicator.

Conclusion

47. In determining this issue I have carefully considered the circumstances under which Dr Gittoes was undertaking his clinical responsibilities; no specialist emergency doctors, a lack of diagnostic equipment and a very busy ED with sole responsibility for all patients. However in all the circumstances I do not accept associate Professor Roche's opinion that Dr Gittoes's notes were adequate and comprehensive. No times are recorded, no specific information regarding the onset and specific nature of the pain and a failure to properly record information provided regarding a family history of heart related issues.

48. Whilst taking into account the many calls on Dr Gittoes's time that afternoon and that he is a general practitioner not an emergency specialist, I accept Associate Professor Holdgate's opinion that Dr Gittoes just didn't think of aortic dissection as a diagnosis. Dr Hanson's opinion supports the conclusion that in a proper consideration on all the clinical information available, coupled with the CPP, aortic dissection as a diagnosis should have been considered. I find several factors in the treatment, monitoring and diagnosis of Alex were not reasonable and appropriate:

- A failure by staff to properly record information provided by the family relevant to Alex's care and treatment
- The notes taken by Dr Gittoes were insufficient and lacked appropriate detail. No times were recorded and a full, proper and detailed history was absent
- Dr Gittoes did not consider aortic dissection as a diagnosis in the circumstances of Alex's ongoing clinical presentation (following the negative troponin results), when it was reasonable to do so.
- The CPP was not appropriately utilised or followed.

Should Alex have been transported to another hospital prior his collapse?

49. For the reasons outlined above, aortic dissection should have been considered and consequently Alex should have been transferred/transported to Tamworth Hospital urgently.

Was it appropriate to transferred Alex from the emergency department to a ward at Gunnedah Hospital?

50. For the reasons also outlined above, Alex should not have been transferred to an unmonitored ward at Gunnedah Hospital.

Was Alex's death preventable?

51. The issue of whether Alex could have been transported to an appropriate tertiary hospital in time for surgery was considered at inquest to determine whether Alex's death was preventable.

What time was it reasonable to have considered a clinical review and subsequent transfer?

52. Dr Hansen considered after the second ECG shortly after 2 pm contact should have been made with Tamworth. However, Alex at that point was in severe pain, confused, agitated and sweating. Dr Gittoes was doing his best to stabilise his condition, reduce his pain levels and conduct an examination and gather information.

53. On this point I prefer the opinion of Associate Professor Holdgate who is an experienced emergency specialist. Associate Professor Holdgate considered 3:30 pm the appropriate time to review Alex following the negative troponin result which in her opinion would properly raise the issue of aortic dissection in accordance with the CPP.

Which Hospital should Alex have been transferred to?

54. Dr Nicholas Ryan has been the Director of Tamworth Hospital ED for the past 20 years. He has known Dr Gittoes for many years however I accepted his evidence on the time frames involved in transfers from Gunnedah to Tamworth and Tamworth to John Hunter Hospital Newcastle. In Dr Ryan's opinion given a suspected diagnosis of aortic dissection could not be confirmed at Gunnedah the usual procedure would be for Alex to be transferred by road ambulance to Tamworth which is the referring hospital for Gunnedah. The time frames are similar for helicopter or ambulance transfer. Dr Ryan has extensive experience and involvement in the transfer and reception of critically ill patients.

55. Given any surgery needed to be undertaken by a specialist surgical cardiothoracic team, John Hunter Hospital in Newcastle is the tertiary hospital Alex would have

been referred to from Tamworth Hospital following a CT scan and diagnosis. Associate Professor Holdgate agreed with this transfer/referral pathway. She found it unlikely John Hunter would accept Alex direct from Gunnedah Hospital without a confirmed diagnosis which could only be made at Tamworth with a CT scan. Associate Professor Roche agreed with this point.

56. Dr Hansen expressed an opinion he may have accepted Alex directly without a positive diagnosis through Tamworth Hospital. However, having heard the opinions of Dr Ryan and associate Professor Holgate I find it unlikely that Alex would be accepted direct from Gunnedah to John Hunter Hospital given the lack of a CT scan and confirmed diagnosis.

Timeframes

57. Having heard from the various specialists regarding whether Alex would have survived to proceed to surgery with a specialist surgical cardiothoracic team at John Hunter Hospital via Tamworth, I find Dr Ryan's estimates, given his experience and knowledge with managing patients involving road and air retrievals the most probable.

58. Any review of Alex at Gunnedah at 3.30pm would require Dr Gittoes to be immediately available and to contact a consultant at Tamworth with a decision to transfer. Delays just in that phase are possible. Following a provisional diagnosis, an ambulance needed to be available at short notice, Alex had to be prepared for transfer, a handover and driving immediately to Tamworth Hospital to the ED would take one and a half hours.

59. Upon arrival at Tamworth ED and being met by an emergency physician Alex would need to be triaged and sent for a CT scan. On the basis the CT scan was not in use or any other delays and the results could be properly interpreted by a physician on-site at Tamworth without the need to refer the scans off-site to a radiologist, a total of one hour. This period is estimated also with no delays in any of the steps.

60. Following diagnosis at Tamworth Hospital contact and consultation with clinicians at John Hunter Hospital via the patient flow unit would have to occur. A consultant or registrar must be available to return the phone call. This may not occur immediately if doctors are in surgery. A discussion with the senior cardiothoracic surgery clinician at John Hunter Hospital then would have to take place. This may involve viewing

images, agreement with the diagnosis, consent to transfer Alex and any advice on patient management enroute.

61. There is a helicopter base Tamworth. If a helicopter was available and there were no weather conditions interfering with the flight, the helicopter would need to be prepared. Alex would have to be stabilised and handed over, flying time is approximately one hour. Once at John Hunter Hospital Alex would proceed through the ED and be seen by a member of the cardiothoracic team and taken to surgery. Dr Ryan stipulated from his experience in an optimal setting 3 hours would be expected time from the initial contact with John Hunter Hospital to Alex being received in theatre.

62. Dr Hansen indicated surgery of this kind, which in Alex's case involved a Type A dissection of the aorta, has a mortality rate of 20-30%. Alex's age and relative good health would assist but it is still high risk surgery. Associate Professor Holdgate was of the view given the timeframes it was more likely than not Alex would not have survived.

Conclusion

63. Taking into account the times indicated above are all optimal and when Alex collapsed at Gunnedah Hospital, I find on the balance of probabilities it is unlikely Alex would have survived. I find Alex's death was not preventable. However, due to a failure to properly diagnose Alex's condition, Alex was not given the chance of surgery. I find that Alex's manner of death was natural causes.

Were the New South Wales health policies in relation to a patient presenting with chest pain appropriate followed?

65. NSW Health Policy Directive PD 2011-037 was issued on 9 June 2011 (updated 30 November 2017). This policy outlines the minimum standards for the management of patients presenting with Chest Pain or other symptoms of myocardial ischaemia. Due to the facilities at Gunnedah the CPP to be used is the "Non Primary PCI Site" CPP. (PCI sites have facilities for coronial angioplasty to be conducted).

66. Gunnedah Hospital utilises the standard NSW CPP. Included in the policy are obligations for Facility General Managers to co-ordinate local education requirements for clinicians. Clinicians are required to comply with the minimum standards of chest pain evaluation. Concerning in this matter is that the CPP was

commenced by RN Sullivan and completed by RN Mainey. No one signed the CPP. All the evidence suggests the assessment of low risk on page 2 was under taken by RN Mainey.

67. Whilst it is accepted that the CPP is a guide only and experienced emergency specialists such as Associate Professor Holdgate do not fill them in, evidence at inquest revealed a poor understanding of the use and responsibilities of the CPP at Gunnedah Hospital. Associate Professor Roche stated experienced clinicians do not need to read everything due to their clinical experience. However in this case Dr Gittoes whilst an experienced doctor was not an experienced emergency physician and had not encountered an aortic dissection previously. Clearly the CPP is there to guide clinicians (no matter what their experience) in such circumstances. Dr Gittoes's evidence that he had never been specifically instructed to use or fill in the CPP at Gunnedah Hospital was not contradicted.

68. The evidence from RN Sullivan and RN Mainey was neither had received any formal training in the CPP prior to Alex's death. I find that nursing and medical staff at Gunnedah did not receive adequate induction, education or have a clear understanding of whom is responsible to determine risk levels and stratification decisions in accordance with the CPP. I find the NSW Health Policy on CPP was not appropriately followed.

Should any recommendations be made pursuant to s 82 of the *Coroners Act* 2009?

69. Alex's case has highlighted the importance of the proper clinical use of the CPP in accordance with NSW Health Policy at sites that do not have emergency or coronary specialists available. I make the following recommendation to the Hunter New England Local Health District:

70. *That all nursing and medical staff who perform duties at Gunnedah Hospital Emergency Department are reminded as part of their induction and ongoing training of the importance of clinical use of the NSW Health Chest Pain Pathway. In addition, all staff are to receive training regarding their specific roles and responsibilities in the use of the Chest Pain Pathway. Audits are to be performed at Gunnedah Hospital to ensure compliance with this recommendation.*

Conclusion

71. Alex's tragic death has impacted enormously on Emma, their three young children and all of their families. Alex was well regarded and respected in Gunnedah, a community where Alex and Emma had decided to settle and bring up their young children together.

I express my sincere condolences to Alex's family for their loss.

I thank Mr Kelly for his assistance in this matter.

Findings pursuant to s 81 of the Coroners Act 2009

Identity
The person who died was Alexander Costello

Place of death
Gunnedah Hospital

Date of death
9 April 2016

Cause of death
Haemopericardium secondary to aortic dissection

Manner of Death
Natural Causes

Les Mabbutt
State Coroner