CORONERS ACT, 2003

SOUTH  *AUSTRALIA*

FINDING OF INQUEST

An Inquest taken on behalf of our Sovereign Lady the Queen at Adelaide in the State of South Australia, on the 20th, 22nd, 24th and 27th days of June, the 1st day of July, the 19th day of August, the 30th day of September, the 25th day of October, and the 18th day of November 2022 and the 1st day of March 2023, by the Coroner's Court of the said State, constituted of Naomi Mary Kereru, Coroner, into the deaths of Beverley Joy Coats, Heather Maude West and Lorna Margaret D'Souza .

The said Court finds that Beverley Joy Coats aged 73 years, late of 4 Levi Street, Birkinhead, South Australia died at the Queen Elizabeth Hospital, 28 Woodville Road, Woodville South, South Australia on the 2nd day of August 2016 as a result of haemopericardium due to ruptured dissection of the thoracic aorta.

The said Court finds that Heather Maud West aged 79 years, late of 55 Riverway, Kidman Park, South Australia died at the Queen Elizabeth Hospital, 28 Woodville Road, Woodville South, South Australia on the 2nd day of May 2017 as a result of acute haemopericardium and haemothorax due to aortic dissection.

The said Court finds that Lorna Margaret D'Souza aged 81 years, late of 627 Grange Road, Grange, South Australia died at the Queen Elizabeth Hospital, 28 Woodville Road, Woodville South, South Australia on the 27th day of May 2019 as a result of haemopericardium due to aortic dissection.

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

1. Introduction

1.1. The inquest into the death of Mrs Beverley Joy Coats commenced on 22 June 2022. Nearing the conclusion of the inquest, evidence was heard that saw it necessary and desirable to join the reportable deaths of Mrs Heather Maud West and Mrs Lorna Margaret D'Souza. I will detail the reason for doing so below.

1.2. Each of the three women died from an aortic dissection. In each instance they presented to the Queen Elizabeth Hospital (QEH) Emergency Department (ED) complaining of symptoms that were the product of aortic dissection. In each case, ED clinicians examined the deceased and undertook certain investigations. In the case of Mrs Coats, she was admitted to the ward, and then re-presented and was admitted on a further two occasions. This was all within a period of 21 days. In the cases of Mrs West and Mrs D'Souza, they were discharged from the ED without admission.

1.3. Mrs Coats died whilst an inpatient during her third admission. Mrs West and Mrs D'Souza died within a few hours of their respective discharge, after returning to the same ED in extremis. The common feature in each of the deaths was that no diagnosis, provisional or otherwise, was made of aortic dissection and they went without effective treatment.

1.4. The issue in this inquest was whether, in all the circumstances, the presentations of each deceased person were such that aortic dissection should, at the very least, have been considered at the time of those presentations. Another issue was whether the presenting symptoms such as back, chest and jaw pain should have raised suspicion as to aortic dissection. In addition, the question is posed, were there measures that could have been put into place to prevent or render less likely missed diagnoses such as these.

2. Legal basis for inquest – joining of Mrs West and Mrs D'Souza

2.1. Functus Officio

As indicated briefly above, the inquest was originally opened to examine the cause and circumstances of the death of Mrs Coats only. Towards the end of the oral evidence in respect of Mrs Coats, the Court heard that there had been a mortality review discussion in relation to two other patients who had presented to the ED at the QEH and died thereafter from aortic dissection.[1] Subsequent inquiries were made by the Court which

[1] Transcript, page 294

revealed two reportable deaths of a similar nature to Mrs Coats. They were the deaths of Mrs West and Mrs D'Souza. It was established that these deaths had been reported and were the subject of an administrative finding as to cause of death only, pursuant to section 29(1)(b) of the Coroners Act 2003 (the Act). This meant the investigation into their deaths had been discontinued.

2.2. Given the similarities of the circumstances, the hospital involved, and the post-mortem findings, consideration was given to the joinder of Mrs West's and Mrs D'Souza's deaths to Mrs Coats' inquest. The Court adjourned on 1 July 2022 in order to commission an expert report from Professor Anne-Maree Kelly (expert emergency physician) to examine their clinical management, as she had done with Mrs Coats. I will detail Professor Kelly's considerable expertise later in this finding.

2.3. While no formal objection was raised to the joining of the deaths of Mrs West and Mrs D'Souza, counsel for Central Adelaide Local Health Network (CALHN) raised a concern that the Court was potentially *functus officio* in respect of enlivening the power under section 21(1)(b) of the Act. This concern was raised due to the existence of administrative findings pursuant to section 29(1)(b) of the Act which were made on 11 September 2019[2] and 27 April 2020.[3]

2.4. By way of explanation, on 2 May 2017 Mrs West died. The State Coroner was notified of Mrs West's death pursuant to section 28(1) of the Act by way of a '*Death Report to Coroner – Medical Practitioners Deposition*' (Medical Deposition) dated 4 May 2017.[4] The notifying medical practitioner was recorded as being Dr Phillip Cowell who stated the reason for the death being notified was that it was '*unexpected*'.

2.5. Mrs D'Souza died on 27 May 2019. The State Coroner was notified of her death pursuant to section 28(1) of the Act also by way of a Medical Deposition dated 27 May 2019.[5] The reason for the notification was also nominated as '*unexpected*' by resident medical officer Dr Rory Maclagan.[6]

2.6. Following receipt of the notifications, the State Coroner commenced the usual investigation process including, in both instances, a direction for a post-mortem

[2] Heather Maud West
[3] Lorna Margaret D'Souza
[4] Exhibit C33
[5] Exhibit C35
[6] Ibid

examination. After those investigations, the State Coroner did not consider that an inquest was necessary or desirable at that time and administrative findings as to cause of death *only* were made under section 29(1)(b) of the Act.[7] That meant the Registrar of Births, Deaths and Marriages was notified and final death certificates issued.

2.7. With those facts in mind, and the Court's consideration of joining the deaths of Mrs West and Mrs D'Souza, counsel for CALHN posed the question, '*Does the State Coroner continue to have jurisdiction to form that view under s.21(1)(b) in circumstances where the State Coroner has already delivered a finding under s.29(1)(b)?*'.[8] I understood counsel to question whether the power to make this decision had been spent and could not be re-exercised, thereby rendering the Court *functus officio*.

2.8. Section 21(1)(b) of the Act states:

> '21—Holding of inquests
>
> (1) The Coroner's Court must hold an inquest to ascertain the cause or circumstances of the following events:
>
> (b) if the State Coroner considers it necessary or desirable to do so, or the Attorney-General so directs—

2.9. Section 29(1)(b) of the Act states:

> '29—Finding to be made as to cause of notified reportable death
>
> (1) Subject to subsection (2), if the State Coroner is notified under this Act of a reportable death, a finding as to the cause of the death must be made—
>
> (b) in any other case—by the State Coroner.'

2.10. The power to hold an inquest is found in section 21(1)(b) of the Act. It enables the Coroners Court to hold an inquest to ascertain the '*cause or circumstances*' of a reportable death when the State Coroner considers it necessary or desirable. A finding made solely as to the '*cause*' of death under section 29(1)(b) of the Act does not consider the '*circumstances*' surrounding the death.

2.11. The provisions referred to above are, in my view, determinative of the issue. Section 29(1)(b) of the Act, empowers the State Coroner, or delegate, to make a finding as to cause of death. It also empowers the Coroners Court, after an inquest, to make a finding

[7] This was in accordance with Section 29(1)(b)of the Act that mandates a finding to be made into every notified reportable death
[8] Transcript, page 314

as to cause of death under section 29(1)(a) of the Act. These are two separate powers, one used by the State Coroner or delegate, and the other in the Coroners Court. The State Coroner and the Court are separate entities. The office of the State Coroner is established by section 4(1) of the Act. The Court is established by section 10, and by section 11, is a court of record. By section 14(1), the Court is constituted of a coroner. The State Coroner has the responsibility of administering the Coroners Court under section 7(1)(a). So, although the State Coroner may, by virtue of being a coroner under the Act, constitute the Court from time to time, when making a finding under section 29(1)(b) the State Coroner is not the Court, and is not exercising the power of the Court to make a finding which is not exercisable except after the holding of an inquest. Put simply, the exercise of power by the State Coroner cannot mean that the Court's power has been spent.

2.12. The doctrine of *functus officio* in the coronial jurisdiction was discussed in the case of *John Fairfax Publications Pty Ltd v Abernethy*.[9] His Honour Justice Adams stated he was of the view that the coroner's jurisdiction would not be exhausted where a finding as to cause of death only had been made, as the Court had not been in a position to make findings as to the manner (circumstances) of death.[10] Moreover, Adams J was of the view that an inquest is not a litigation in the sense that it gives rise to *res judicata* and having regard to undetermined issues, the Coroner is not *functus officio*.

2.13. Citing *Hoban v Davey*[11] and *NSW Insurance Ministerial Corp v Edkins*,[12] His Honour regarded the most material consideration to be that a substantial outstanding issue, requiring a finding, had not been made; '*It is the essence of the notion of functus officio that the relevant function or office has been discharged or performed "the purpose for which its creation has been fulfilled*"'.[13] In principle, Adams J's position was that the Court's function could not be discharged when a substantial outstanding issue such as the circumstances concerning death had not been the subject of a finding.

2.14. Moreover, the Act provides statutory power for the Court to reopen an inquest, ***at any time***,[14] in order to confirm any previous finding,[15] set aside any previous finding,[16] or

[9] [1999] NSWSC 820
[10] Ibid
[11] (1972) 1 NSWLR 59 per Asprey JA at 68-69
[12] (1998) 45 NSWLR 8
[13] Leung v Minister for Immigration (1997) 79 FCR 400 per Finkelstein J at 410
[14] Coroners Act 2003, SA, Section 26(1), my own emphasis
[15] Ibid Section 26(2)(a)
[16] Ibid Section 26(2)(b)

substitute a finding that appears justified by the evidence.[17] As clearly expressed, this could occur at ***any time*** including ***after*** the provision of findings as to ***cause and circumstances***.[18] *A Fortiori*, the situation of examining the circumstances of death, where a finding as to cause of death only has been made.

2.15. It was for the foregoing reasons that I did not consider the Court to be *functus officio* in respect of the Court's jurisdiction to inquire into the circumstances of Mrs West's and Mrs D'Souza's deaths at inquest.

2.16. Professor Kelly's report dated 13 August 2022 which was ultimately tendered to the Court,[19] detailed that while the incidence of aortic dissection is rare, the presentations of Mrs West and Mrs D'Souza should have raised suspicion of aortic dissection to the clinicians treating them in the ED of the QEH, and seen further investigations undertaken before they were discharged. Professor Kelly opined that in the case of Mrs West, there was probably sufficient time to have investigated and intervened if appropriate. It was against that background that it was considered 'necessary or desirable' for the Court to join the deaths of Mrs West and Mrs D'Souza with a view to examining the circumstances of death, including whether their deaths were preventable and whether the implementation of change might prevent further incidence of fatal aortic dissection.

3. The post-mortem examinations and causes of death

3.1. A post-mortem examination was conducted on the remains of each of the women.

3.2. Mrs Coats was 73 years of age when she died on 2 August 2016 after collapsing in the bathroom of her room in the QEH whilst an inpatient. Mrs Coats' post-mortem examination was conducted by Dr Neil Langlois, consultant forensic pathologist at Forensic Science South Australia (FSSA). In Dr Langlois' opinion, Mrs Coats' cause of death was haemopericardium due to ruptured dissection of the thoracic aorta.[20] I find that to be the cause of Mrs Coats' death.

3.3. Mrs West was 79 years of age when she died on 2 May 2017. Mrs West died in the ED of the QEH shortly after arrival. She had been conveyed there by the South Australian Ambulance Service (SAAS) with chest pain and shortness of breath after her discharge

[17] Ibid Section 26(2)(c)
[18] My own emphasis
[19] Exhibit C31
[20] Exhibit C2a

from the same ED earlier that day. Mrs West's post-mortem examination was conducted by Dr Stephen Wills, forensic pathologist at FSSA who concluded that Mrs West's cause of death was acute haemopericardium and haemothorax due to aortic dissection.[21] A finding as to cause of death was made on 11 September 2019, pursuant to section 29(1)(b) of the Act. For completeness, I find that to be the cause of Mrs West's death pursuant to section 29(1)(a) of the Act.

3.4. Mrs D'Souza was 81 years of age when she died on 27 May 2019. Mrs D'Souza was on her way home from the ED at the QEH after being discharged, when she became unresponsive. Mrs D'Souza was returned to the ED but was unable to be resuscitated. Dr Karen Heath, forensic pathologist at FSSA, conducted the post-mortem on Mrs D'Souza's remains. It was Dr Heath's opinion that Mrs D'Souza's cause of death was haemopericardium due to aortic dissection.[22] A finding as to cause of death was made on 27 April 2020, pursuant to section 29(1)(b) of the Act. For completeness, I find that to be the cause of Mrs D'Souza's death pursuant to section 29(1)(a) of the Act.

4. Aortic dissection

4.1. The aorta is the largest artery of the body and carries blood from the heart to the circulatory system. The aorta has three layers – the intima, the media and the adventitia. The ascending aorta rises up from the heart in the chest, the aortic arch curves over the heart, and the descending thoracic aorta travels down through the chest leading into the abdominal aorta. With age, and other aortopathy such as Marfan's Syndrome and aortic valve disease, the aorta can become weak and with the pulsatile pressure of the blood, it can tear. Hypertension is also a risk factor. A tear may split the innermost layer of the wall of the aorta (intima), allowing blood to track between the other layers causing them to weaken until it escapes by rupturing out. One area to which it can escape is the pericardial sac.

4.2. The pericardial sac is a serous membrane which encloses and protects the heart. If the pericardium is filled with blood, the heart is compressed and is no longer able to contract or beat. This is referred to in medical terms as a haemopericardium. It is not difficult to appreciate that this is a catastrophic event that can lead to sudden death.

[21] Exhibit C20a
[22] Exhibit C26a

In each of the three women's deaths, the location of the tear in the aorta was such that it ruptured into the pericardial sac causing a haemopericardium.

4.3. There are two types of aortic dissection. Type A dissections (65-70% of cases) involve the ascending aorta, with or without the descending aorta. Type B dissections (30-35% of cases) involve the descending aorta only, which begins after the start of the left subclavian artery.[23] Due to the location of the tear in their aortas, Mrs Coats, Mrs West and Mrs D'Souza were all in the type A category.

4.4. There are certain classic symptoms that are associated with aortic dissection; severe pain in the chest or back described as tearing, ripping and unremitting. These symptoms can masquerade as symptoms from a cardiac origin. However, aortic dissection can present with atypical symptoms such as abdominal or epigastric pain or abdominal fullness.[24] Examination features include tachycardia, hypertension, a new heart murmur, a difference in blood pressure or pulse between limbs and neurological signs.[25]

4.5. With symptoms including that of chest pain, aortic dissection is often mistaken for acute coronary syndrome in the ED setting. This suspicion would enliven the chest pain protocol or pathway which dictates that certain investigations are performed, namely ECG, serial troponin tests and chest x-rays. These investigations are often not sensitive to a diagnosis of aortic dissection.

4.6. CT aortogram is the gold standard imaging modality to confirm or exclude a diagnosis of aortic dissection. If an aortic dissection is diagnosed, 90% of patients with acute type A dissection will die if they do not undergo emergency surgery within three months.[26] However, emergency surgical intervention is associated with a high incidence of death, up to 30%.[27] The mortality of surgical intervention is dependent upon a number of factors including the location of the tear in the aorta.

5. <u>Witnesses in relation to Mrs Coats</u>

5.1. The Court heard oral evidence from a number of witnesses in relation to the cause and circumstances of Mrs Coats' death.

[23] Exhibit C12a, page 17
[24] Exhibit C12a, page 17
[25] Exhibit C12a, page 17
[26] Exhibit C12a, page 18
[27] Exhibit C12a, page 18

5.2. Professor Anne-Maree Kelly

Professor Kelly was the first witness and gave evidence in her capacity as an expert in emergency medicine. Professor Kelly is an extremely experienced clinician who is a fellow of the Australasian College for Emergency Medicine and elected to fellowship in 1990. She currently holds the posts of Professor and Academic Head of Emergency Medicine and Senior Emergency Physician at Western Health in Footscray, Victoria and Adjunct Professor at the Australian Centre for Health Law Research, Queensland University of Technology. Professor Kelly has more than 30 years' experience in EDs, as a specialist in South Australia, New Zealand and Victoria. She has worked in large, medium-sized and small EDs and in public rural and urban, and private hospital settings treating both adults and children.

5.3. Professor Kelly co-authored a paper entitled '*What Can Be Done to Improve Diagnosis of Aortic Dissection*', which was tendered to the Court.[28] This paper focused on the need to balance missing a diagnosis of aortic dissection with the potential adverse effects of over investigation. The paper recommended several approaches to improve the detection rate while maintaining this balance.

5.4. Another paper entitled '*Collaboration Between the Coroner and Emergency Physicians: Efforts to Improve Outcomes from Aortic Dissection*' was also tendered.[29] This paper arose from a round table discussion held by the Coroners Prevention Unit, an initiative of the Coroners Court of Victoria, in which Professor Kelly participated along with 16 other emergency practitioners from Melbourne Hospitals in 2014. The Coroners Prevention Unit had recognised that in light of the death of an older woman from aortic dissection, a dialogue with Victorian emergency physicians might enable opportunities for prevention to be better diffused.

5.5. Dr Jacob Goldstein

Dr Goldstein gave evidence in his capacity as an expert cardiothoracic surgeon. Dr Goldstein provided an expert overview of the management of Mrs Coats both prior to and including her presentations and admissions to the QEH in July 2016. Following the commission of his report dated 4 May 2018, Dr Goldstein had retired from surgical duties but continued to consult. Prior to that, Dr Goldstein was a cardiothoracic surgeon in excess of 30 years. In that time he was the head of cardiothoracic surgery at the

[28] Exhibit C31b
[29] Exhibit C13

Monash Medical Centre in Melbourne for seven years and was a supervisor of surgical training at the Monash Medical Centre for 25 years. Dr Goldstein gave his oral evidence via the online video conferencing platform of Webex.

5.6. Even though the aortic dissection was not diagnosed, and Mrs Coats did not undergo emergency cardiothoracic surgery in an attempt to repair the dissection, Dr Goldstein's evidence was important to understand whether or not surgical intervention was in fact a possibility given the high mortality rate of the procedure. This was particularly so in light of the location of the dissection in the aorta and Mrs Coats' age and comorbidities. Dr Goldstein gave evidence that he had experience in the provision of surgical management and advice for patients with aortic dilatation and aortic dissection.[30]

5.7. Dr Vincent Goh

Dr Goh gave evidence in his capacity as Mrs Coats' treating cardiologist. Dr Goh is a clinical cardiologist who obtained his Bachelor of Medicine and Surgery from the University of Manchester in 2003. He completed advanced training in cardiology at the QEH in 2012 and obtained his fellowship at the Royal Australasian College of Physicians in September 2012. At the time Mrs Coats consulted with Dr Goh, he was working as a private cardiologist at SA Heart at the Findon Practice. Dr Goh's evidence canvassed his management of Mrs Coats' dilated aorta (a risk factor for aortic dissection), including the institution of yearly echocardiograms.

5.8. Dr Yousouf Peerbaye

Dr Peerbaye gave evidence in his capacity as an ED physician who had worked at the QEH ED since 2011. Dr Peerbaye was called as a witness to explain the change in record management from paper-based notes to EPAS, and whether records from the paper based system were readily and easily available to those using the electronic system.

5.9. Furthermore, Dr Peerbaye gave evidence about the existence of the Emergency Department Pathway for Risk Stratification and further investigation of Patients with suspected Acute Coronary Syndrome (ACS) (ACS Pathway) as it existed at the time of Mrs Coats' presentations in July 2016. Dr Peerbaye's evidence was of particular importance as it established that at the time of Mrs Coats' presentations, the QEH ED's ACS Pathway did not include aortic dissection as another life-threatening diagnosis for

[30] Transcript, page 139

clinicians to consider. This became a point of focus for the inquiry notwithstanding that back pain, which Mrs Coats complained of during the three admissions in July 2016, was not thought to be of cardiac origin by the treating clinicians.

6. Witnesses in relation to Mrs West and Mrs D'Souza

6.1. The only witness called in relation to the deaths of Mrs West and Mrs D'Souza was Professor Kelly, whose expertise has been outlined above.

6.2. Dr Goldstein provided an expert report on whether Mrs West was a suitable candidate for surgery had the dissection been discovered. This was tendered to the Court.[31]

7. Overview of events leading up to Mrs Coats' death

7.1. It is convenient here to describe in brief, the relevant features leading up to Mrs Coats' death. The factual matrix is somewhat more complicated than that of Mrs West and Mrs D'Souza. This was because Mrs Coats had a known risk factor for aortic dissection (aortic dilatation) and when she presented to the QEH ED with back pain on 13 July 2016, this active medical condition was not identified. The time between the first presentation for back pain and her death was also prolonged, which the Court heard was unusual for aortic dissection. Aortic dissection is usually a sudden continuous event, lasting less than a day.[32]

7.2. Mrs Coats, at the age of 73, lived alone and independently in the suburb of Birkenhead, South Australia. Mrs Coats' medical history included hypertension, ischaemic heart disease, chronic obstructive pulmonary disease, haemorrhagic stroke, right knee haematoma and atrial fibrillation, dilated ascending aorta and aortic root, and mild aortic regurgitation.[33]

7.3. Mrs Coats was under the care of a cardiologist following a diagnosis of severe triple vessel coronary artery disease in 2011. This diagnosis brought about investigations which led to the discovery of a dilated ascending aorta and aortic root. Mrs Coats regularly saw her general practitioner (GP), Dr George Isaac at Harbour Medical Clinic from 2014 until her death.

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[31] Exhibit C32
[32] Transcript, page 58
[33] Exhibit C2a, page 2

7.4. In February 2016, Mrs Coats suffered a fall injuring her right knee and was hospitalised at the QEH. As Mrs Coats was anticoagulated for atrial fibrillation, which heightened her risk of an internal bleed, information was sought by the ED staff from her GP, Dr Isaac.[34] In response, Dr Isaac sent by way of facsimile to the QEH[35] information relating to Mrs Coats' cardiac conditions, including detailed letters and test results from her cardiologist, Dr Goh. Importantly, this included information relating to Mrs Coats' ascending aortic and aortic root dilatation.

7.5. Mrs Coats' hospitalisation was complicated after the fall by the development of a necrotic skin flap which required debridement. Mrs Coats was ultimately transferred to the Hampstead Rehabilitation Centre on 1 March 2016. She was discharged back to her home on 18 March 2016.[36] Mrs Coats' daughter, Ms Sarah Pretty, provided information to the Court which described an '*excellent recovery*' from the fall.

7.6. On 13 July 2016, Mrs Coats was conveyed by SAAS to the QEH ED after an episode of back pain. Mrs Coats described to the ED doctor that she had travelled over a speed hump and had experienced an instant onset of sharp severe back pain with nausea and vomiting. A niggling back pain the evening before had reportedly preceded the severe pain. Mrs Coats was admitted to the ward with a provisional diagnosis of acute exacerbation of thoracic back pain. It was queried whether she had suffered a crush fracture to her thoracic vertebra. Mrs Coats was prescribed opioid pain medication during her admission. She was discharged on 16 July 2016 with a diagnosis of acute on chronic spinal degenerative disease. Of importance was that Mrs Coats' admission was recorded in electronic form (as opposed to handwritten casenotes), as it was around this time that the QEH had moved to EPAS[37]. Nowhere in these electronic records was Mrs Coats' active medical condition of a dilated aorta documented.

7.7. On 20 July 2016, Mrs Coats attended an appointment with her GP, Dr Isaac. Dr Isaac detailed this attendance in an affidavit which was tendered to the Court.[38] In his affidavit he recalled that at this appointment Mrs Coats '*presented as confused, complained of back pain, she was tired and struggling, vomiting and not eating*'.[39] Mrs Coats explained she had been in hospital but was unsure what the diagnosis was.

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[34] Exhibit C7, page 4
[35] Exhibit C6, pages 11-30
[36] Exhibit C7, page 52
[37] Enterprise Patient Administration System; An electronic patient record system
[38] Exhibit C8
[39] Exhibit C8, paragraph 5

Dr Isaac stated he was yet to receive the discharge summary from the QEH and asked his staff to obtain it.[40] Dr Isaac instructed Mrs Coats to reattend the ED at the QEH and gave her a letter which he had written, requesting an opinion and management for deterioration in her medical state.[41] This letter set out Mrs Coats' medical history and included '*moderately dilated ascending aorta*'.[42]

7.8. Mrs Coats did reattend the QEH ED on 20 July 2016 at approximately 7:30pm. Records reflected that she was conveyed there by SAAS. The electronic EPAS notes reflected the primary complaint to be nausea and vomiting, although it was recorded that she had ongoing back pain with some migration of pain to her shoulders.[43] While there was no mention of the letter from Dr Isaac, it was noted that she had recently been discharged from the hospital and that her GP had recommended she return.[44] Mrs Coats was admitted to the ward the next morning and investigated for acute kidney injury after admission bloods revealed renal impairment. Mrs Coats' anti-hypertensive medication, perindopril, was ceased due to a contraindication with renal dysfunction. No alternative anti-hypertensive medication was instituted at that time. After a course of fluids (for dehydration) and antiemetics (for nausea), Mrs Coats was discharged with a diagnosis of renal impairment and referred back to her GP.

7.9. The failure to commence an alternative anti-hypertensive medication in a patient with chronic hypertension and a number of cardiac comorbidities was a particularly worrying feature of Mrs Coats' clinical care at the QEH. At the time of discharge from her second admission, it was not known when or if she would return to the hospital. It was therefore essential, rather than relying on her GP, to institute a medication that would control her hypertensive heart disease, which was a chronic and a potentially life-threatening disease in and of itself. I will return to this issue later in the finding.

7.10. On 28 July 2016, Mrs Coats re-presented to the ED at the QEH by SAAS. It was recorded that she complained of ongoing pain in her back which radiated to her shoulders and abdomen with some shortness of breath.[45] This was the third presentation to the same hospital in 16 days, which was noted in the ED admission entry. The admission entry strangely recorded a different presenting complaint to the triage note,

[40] Exhibit C8, paragraph 5
[41] Exhibit C8, Annexure C, page 16
[42] Ibid
[43] Exhibit C6c, page 47
[44] Exhibit C6c, page 42
[45] Exhibit C6d, pages 24-25

recording that Mrs Coats had re-presented with ongoing urinary symptoms with increased urinary frequency.[46]

7.11. The ED notes reflected Mrs Coats to be hypertensive with a blood pressure reading of $^{163}/_{97}$ and that her usual anti-hypertensive medication was still '*on hold*'.[47] As with the electronic casenotes for the previous two entries, there was no mention in these notes of Mrs Coats' medical history including a dilated aorta. Mrs Coats was admitted to the ward and underwent investigations including for a urinary tract infection. Over the next four days, there were a number of alerts relating to Mrs Coats' high blood pressure.[48]

7.12. On 2 August 2016, a nursing note with a time stamp of 9:22am recorded that a pain in Mrs Coats' shoulder had become severe and she was distressed. The assessment at that time queried a gastric ulcer or gastro-oesophageal reflux disease (GORD).[49] A short time later Mrs Coats was found in an unresponsive state on the toilet floor with her head on a shower chair.[50] Mrs Coats had an active Do Not Resuscitate order (DNR). Accordingly, no resuscitative measures were implemented. Mrs Coats was pronounced life extinct at 9:47am on 2 August 2016.

7.13. Over the course of the three admissions in July 2016, it is noteworthy that Mrs Coats was investigated for several different ailments, none of which included aortic dissection. The expert evidence commented on the confounding nature of these presentations which may have prevented clinicians from reaching a diagnosis. However, there were aspects of these presentations in isolation and collectively, about which Professor Kelly and Dr Goldstein expressed concern. I will detail these concerns later in the finding with reference to each admission.

8. Mrs Coats' diagnosis and management of aortic dilatation 2011-2015

8.1. As touched on above, a relevant aspect of Mrs Coats' medical history was the diagnosis of an aortic dilatation (ascending and root). As this was an active medical condition that increased Mrs Coats' risk of aortic dissection, one question that arose at the inquest was why the clinicians treating her at the QEH in all three July 2016 admissions were not aware of it. This was particularly so given documentation detailing the condition

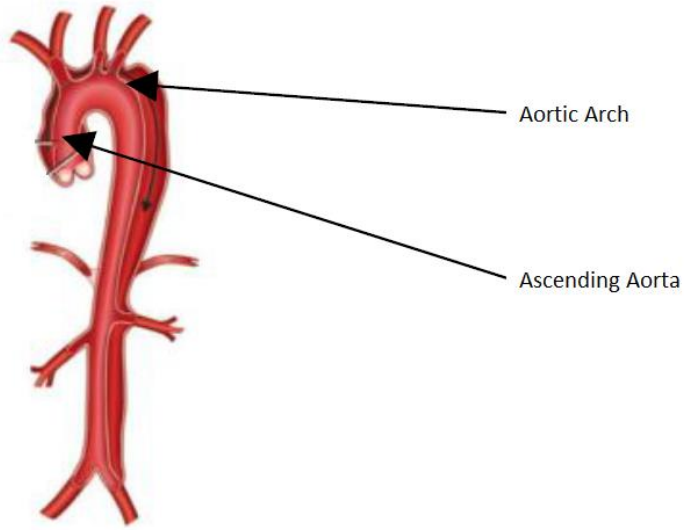
[46] Exhibit C6d, page 32
[47] Exhibit C6d, pages 32-33
[48] Exhibit C6d, pages 211, 212, 215
[49] Exhibit C6d, page 73
[50] Exhibit C6d, page 77

was contained within the QEH clinical notes. An associated question was whether it would have changed the outcome if this condition was known to those treating her at the QEH. Accordingly, it is important to detail this history before examining the July 2016 admissions.

8.2. The aortic dilatation was diagnosed in the weeks following an episode of chest pain experienced on 18 March 2011 for which Mrs Coats was hospitalised. On that day Mrs Coats was conveyed by SAAS to the ED at the QEH complaining of central crushing chest pain which radiated to her jaw and back as well as shortness of breath.[51] Mrs Coats underwent investigations for acute coronary syndrome (ACS) and the ED clinician also ordered an aortogram to investigate aortic dissection. This was in response to the results of a chest x-ray which queried an enlarged thoracic aorta.[52] While both conditions were excluded, Mrs Coats was admitted to a ward under the cardiology team and underwent a coronary angiogram on 20 March 2011. This revealed severe triple vessel coronary artery disease. As there was no acute process underway, Mrs Coats was discharged for review in the community with cardiologist, Dr Onn Akbar Ali.[53]

8.3. It is evident that Mrs Coats saw Dr Akbar Ali shortly after her discharge from hospital as the records reflect that he performed an echocardiogram on 6 April 2011.[54] While this was reassuring in respect of Mrs Coats' cardiac function, it showed that Mrs Coats had mild aortic root (4.3cm) and mild ascending aortic (4cm) dilatation. The normal mean diameter of an aorta for a woman of Mrs Coats' age, was 3.4cm.[55] The Court heard and received evidence that aortic dilatation was a risk factor for aortic dissection and therefore required monitoring by way of regular echocardiograms. The level of dilation dictated the frequency of monitoring. I insert an image from Professor Kelly's report to illustrate the areas of Mrs Coats' dilated aorta.[56]

[51] Exhibit C6, page 487
[52] Exhibit C6, page 496
[53] Ibid
[54] Exhibit C16a, paragraph 2.4
[55] Exhibit C16c, Appropriateness Guideline for Adult Echocardiography (New Zealand), page 13
[56] Exhibit C12a, page 15



8.4. Dr Goh, cardiologist, took over the care of Mrs Coats in August 2013 when Dr Akbar Ali moved to Malaysia.[57] As indicated above, Dr Goh provided a signed statement and gave oral evidence at the inquest about his management of Mrs Coats between 2013 and 2016. This included detailed letters to Mrs Coats' referring GP at the Harbour Medical Clinic.[58] Of relevance to the inquest was Dr Goh's management of Mrs Coats' hypertension (which was at times sub optimally controlled) and her increasingly dilated aorta.

8.5. Dr Goh explained that shortly after taking over Mrs Coats' care, he considered it important, amongst other things, to ensure her blood pressure was managed as high blood pressure could continue to stretch an already dilated aorta[59], placing it at risk of severe dilatation and possible dissection and rupture.[60]

8.6. Between 2013 and late 2014, Mrs Coats had experienced a slow heart rate, palpitations, and some breathlessness. Her blood pressure was also elevated at times. Dr Goh undertook investigations and altered Mrs Coats' medication regime, ultimately prescribing a higher dose of the anti-hypertensive medication, perindopril, with good effect. In the course of those investigations a further echocardiogram was performed on 29 October 2014. This revealed an increase in the aortic dilatation from mild to mild-moderate.[61] Dr Goh was of the opinion that this necessitated yearly

[57] Exhibit C16a, paragraph 2.1
[58] Exhibit C7
[59] Exhibit C16a, paragraph 3.3
[60] Transcript, page 224
[61] Exhibit C6, pages 19-20

echocardiograms to monitor any further dilation.[62] Upon further review in April 2015, Mrs Coats' blood pressure was mildly elevated. In response, Dr Goh added a second anti-hypertensive medication, amlodipine 2.5mg, in addition to perindopril.[63] At some point, a third anti-hypertensive, isosorbide mononitrate, was added. The latter two anti-hypertensives were held during Mrs Coats' admission in February 2016 after her fall, following a hypotensive episode.[64] It does not appear that they were reinstituted prior to the July 2016 admissions.

8.7. Dr Goh explained that Mrs Coats underwent a further echocardiogram in accordance with the management plan on 15 October 2015.[65] This revealed a further dilation of the ascending aorta to 4.5cm. Dr Goh described this 0.2cm increase in the ascending aorta as a '*minimal change*'.[66] Dr Goh's statement outlined four further reviews of Mrs Coats between November 2015 and 1 June 2016. Mrs Coats' next echocardiogram to monitor her aorta was scheduled for 5 October 2016, however her death occurred prior to this appointment.

8.8. While Dr Goh's oral evidence was largely of assistance to establish history in relation to Mrs Coats' aortic dilatation, there were two aspects of his management that were examined. The first was whether, in light of the increasing size of Mrs Coats' ascending aorta, investigations in addition to yearly echocardiograms were indicated in late 2015 - early 2016. The second was whether Dr Goh had explained to Mrs Coats the potential risk of a dilated aorta such that she would relay it as an active medical condition to others treating her. Strangely, the EPAS clinical records were absent of any reference about her aortic condition from Mrs Coats herself.

9. <u>Further investigations for aortic dilatation</u>

9.1. Two articles detailing guidelines relevant to the monitoring of aortic dilatation were provided by Dr Goh and tendered to the Court.[67] These articles detailed the different management regimes of aortic aneurysm (dilatation) amongst different bodies internationally, in particular the USA and Australia/New Zealand. Dr Goh gave evidence that the Cardiac Society of Australia and New Zealand (CSANZ) set the

[62] Exhibit C16a, paragraph 3.10
[63] Exhibit C16a, paragraph 3.13
[64] Exhibit C7, page 71
[65] Exhibit C6, page 27
[66] Exhibit C16a, paragraph 3.13
[67] Exhibit C16c, Appropriateness Guideline for Adult Echocardiography (New Zealand); Cleveland Journal of Medicine Thoracic aortic aneurysm: Optimal surveillance and treatment

normal mean diameter of an aorta for a woman of Mrs Coats' age at 3.4cm.[68] The upper limit of normal was set at 3.9cm. For aortic aneurysm below 4.7cm, the recommendation for monitoring by way of echocardiograms was every three years.[69] The table below depicts the echocardiogram recommendations of CSANZ based on aortic diameter and underlying aortopathy.

Diameter	Aetiology	Recommendation
Within ULN	No aortopathy	Discharge GP
Above ULN / below 47 mm	No aortopathy	3 years for first FU
≥ 47 mm	No aortopathy	Annual follow up
Above ULN	Aortopathy	3 year follow up
≥ 43 mm	Aortopathy	Annual follow up

Table 3: Recommendation based on aortic diameter and underlying aortopathy. Take other risk factors into account.

9.2. As outlined above, in 2015 Dr Goh had established that Mrs Coats' aortic root and ascending aorta were 4.4cm and 4.5cm in diameter respectively. Dr Goh told the Court that it was his practice, notwithstanding the CSANZ guidelines, to order annual echocardiograms, in line with the US Guidelines which recommended: '*If TAA*[70] *<5.0cm and stable, then yearly echocardiograms*'.[71] When asked for his opinion on the appropriateness or otherwise of this practice, Dr Goldstein was of the view that yearly echocardiograms were appropriate and this was in line with other practitioners (cardiologists).[72]

9.3. The reason behind monitoring the level of dilatation was to have a threshold for surgical intervention, to repair the dilated aorta, thereby preventing an aortic dissection. Dr Goldstein told the Court that the surgical threshold had reduced over the years from 6.0cm to 5.5cm, with the current level of dilation to be 5.0cm.[73] Dr Goldstein explained

[68] Exhibit C16c, Appropriateness Guideline for Adult Echocardiography (New Zealand), page 13
[69] Ibid, page 14
[70] Thoracic Aortic Aneurysm
[71] Exhibit C16c, Cleveland Journal of Medicine Thoracic aortic aneurysm: Optimal surveillance and treatment, page 10
[72] Transcript, page 50
[73] Transcript, pages 156-157

that he (as a surgeon) would have a lower threshold if the patient had other underlying conditions (aortopathy). Mrs Coats had no such underlying conditions.

9.4. Located underneath the table recommending the frequency of echocardiograms, the CSANZ Guidelines stated:

> 'Consider MRI or CT for the assessment of aorta dimensions and configuration. In particular consider CT or MRI when within 0.5cm of surgical threshold. Direct comparisons should be undertaken in the same imaging modality.' [74]

9.5. Accepting that the surgical threshold was 5.0cm,[75] Dr Goh was asked whether he had turned his mind to performing an MRI or CT scan in addition to the annual echocardiogram, given Mrs Coats' aortic dilatation was within 0.5cm of the surgical threshold in 2015.[76]

9.6. Dr Goh gave evidence that he had not turned his mind to undertaking further imagery following the results of the 2015 echocardiogram. He told the Court that in 2015 he planned to continue his current management of Mrs Coats' condition as there had been no significant change in the rate of aortic dilatation from 2014 to 2015.[77]

9.7. Dr Goh explained that he also considered the CT aortogram that was undertaken in 2011 as a baseline which did not reveal any other aortopathy and referring Mrs Coats for a CT scan would expose her to further radiation, which he did not consider warranted at that time.

9.8. Dr Goh frankly conceded that his practice has since changed and if he was now monitoring a patient with an aortic dilatation of 4.5cm he would arrange an MRI or CT scan in addition to other monitoring.[78]

9.9. Notwithstanding Dr Goh's concession, Dr Goldstein opined that the results of the 2015 echocardiogram, revealing the size of the ascending aorta and the aortic arch, did not mandate surgical intervention.[79] Dr Goldstein stated that he would have been more concerned had the measurements been closer to 5.0cm. Even if surgery was considered necessary to repair the aorta, Dr Goldstein was guarded about whether Mrs Coats was

[74] Exhibit C16c, Appropriateness Guideline for Adult Echocardiography (New Zealand), page 14
[75] Transcript, page 231
[76] Transcript, page 231
[77] Transcript, page 233
[78] Transcript, page 236
[79] Transcript, page 154

a suitable candidate for surgical intervention. Dr Goldstein raised a number of factors relevant to this consideration, namely Mrs Coats' triple vessel disease, chronic obstructive airways disease, and renal function (if surgery had been considered at a time when it had deteriorated).[80] Ultimately, Dr Goldstein did not have enough information about Mrs Coats' comorbidities as they were in 2015 - early 2016, to state an opinion one way or the other.[81]

9.10. The other matter raised with Dr Goh was whether he had adequately explained to Mrs Coats the risks associated with aortic dilatation, and what symptoms to watch out for in the event of a dissection. As stated earlier in the finding, there was no record in the three QEH July 2016 admissions of Mrs Coats providing clinicians with history of aortic dilatation, raising a question as to whether she was aware of this active medical condition, and the associated risks.

9.11. Dr Goh could not remember the specific advice that he gave to Mrs Coats about warning symptoms of an aortic dissection. He did however give evidence that his usual practice for a patient with a dilated aorta was an instruction to seek medical attention if they experienced chest or back pain as this could be a warning sign of aortic dissection.[82]

9.12. While Dr Goldstein agreed with the obligation to inform Mrs Coats of her larger than normal aorta, as well as the risk that it may increase and the possible need for surgery, he was not in favour of educating a patient about symptoms that might be associated with aortic dissection. Dr Goldstein said:

> 'Look, that's a difficult one, because you have a whole textbook of possible complications. Aortic dissection, it involves the main artery in the body and therefore the artery that supplies blood to the whole body except for the lungs. The number of complications that you can have is huge, depending on which arteries are compromised by the aortic dissection … I don't think you could tell a patient comprehensively all of that without sitting down for an hour or so. And I think the main thing that you would want to tell the patient is that there is a risk that you can have a tear in the aortic wall and that that can result in multiple different complications, depending on where the tear occurs, and which arteries are compromised. I think that would suffice at that stage.' [83]

9.13. While Dr Goh did not have a memory of exactly what he said to Mrs Coats about her aortic dilatation, I accept that he had a general practice about informing his patients of

[80] Transcript, pages 156-158
[81] Transcript, page 159
[82] Transcript, page 240
[83] Transcript, page 160

the condition and the associated risks and that he followed this general practice with Mrs Coats. Dr Goldstein had a slightly different general practice, but I did not understand him to be critical of Dr Goh's management of Mrs Coats in anyway.

9.14. Dr Goh expressed his own concerns relating to Mrs Coats' three admissions to the QEH in July 2016. These concerns were threefold:

- That treating clinicians at the QEH in July 2016 did not have regard to the letters and echocardiograms which set out the dilation of Mrs Coats' aorta, despite forming part of the QEH clinical record.[84] Dr Goh was of the opinion that the move from paper based casenotes to the electronic EPAS in 2016 was partly causative.[85] He had firsthand experience of this difficulty as he had worked at the QEH in 2016.
- The lack of communication from the QEH to Mrs Coats' regular doctors. Dr Goh told the Court that had he been contacted, he would have enquired as to the circumstances relating to her admissions and would have been in a position to provide details of her current medical conditions, including her dilated ascending aorta.[86]
- Finally, the suboptimal management of Mrs Coats' blood pressure particularly in her final admission.

9.15. The expert witnesses were asked for their comment on each of these matters which will be expanded upon in the context of their evidence as it related to each admission.

9.16. In terms of Dr Goh's own management of Mrs Coats, I formed the impression from the evidence before the Court that Dr Goh was a helpful and reflective witness who carefully managed Mrs Coats' cardiovascular disease and aortic dilatation. I find that Dr Goh's management of Mrs Coats was of a high standard.

10. Mrs Coats' first admission 13 to 16 July 2016

10.1. As touched on above, Mrs Coats' first presentation to the QEH on 13 July 2016 was brought about by a sudden and severe onset of sharp back pain after driving over a speed hump, which had been preceded by niggling back pain for several weeks following a fall. This was associated with vomiting, although it was unclear whether

[84] Exhibit C6, pages 17-30
[85] Transcript, pages 226-227
[86] Exhibit C16a, paragraph 4.5, page 8

this was a side effect of the tramadol tablet Mrs Coats' daughter had given her prior to arrival at the ED.

10.2. Once in the ED, it was recorded that Mrs Coats described the pain in her back as an ache and moderate in severity. She was hypertensive with a blood pressure reading of $^{196}/_{101}$ and reported a pain score of $^{8}/_{10}$.[87] It was noted that Mrs Coats appeared to be in pain and was sweaty. She was admitted to the ward.

10.3. While sudden onset of severe back pain is a classic symptom of aortic dissection, Professor Kelly was of the opinion that the history provided by Mrs Coats (sudden onset of pain while going over a speed hump in a woman with pre-existing back pain), made the constellation of symptoms less suggestive of an aortic dissection.[88] Professor Kelly was of the view that the diagnosis of degenerative acute on chronic thoracic back pain was not unreasonable in the circumstances. She gave this evidence:

> 'I have spent quite a lot of time thinking about this because obviously with the benefit of hindsight, one, it can be quick to judge, and in the context, I think that most practitioners in emergency medicine would have had an initial thought that this was probably a musculoskeletal cause and queried whether there was a crush fracture or something similar of the bones as the cause of that. I don't think that many practitioners in the context would have considered aortic dissection a likely diagnosis.' [89]

10.4. Dr Goldstein's opinion aligned with Professor Kelly's on this topic insofar as aortic dissection was a rare condition. He expressed the view that the lack of consideration of aortic dissection was to some degree understandable, given its relatively uncommon occurrence.[90] Further, he stated that the description of driving over a speed hump at the time of the onset of pain did not fit with a traumatic aortic dissection, such as a high-speed deceleration injury sustained in a head-on collision motor vehicle accident, or a fall from a height.[91]

10.5. A number of investigations were undertaken during the course of the first admission, including blood tests, a bedside urine sample and a chest x-ray. Other than slightly abnormal results for kidney function, non-specific elevation of her white cell and

[87] Exhibit C6b
[88] Transcript, page 24
[89] Transcript, page 40
[90] Exhibit C14a, page 6
[91] Transcript, page 164

neutrophil counts, and lower thoracic spine degenerative changes, no acute cause for the back pain was diagnosed.

10.6. The chest x-ray undertaken on 13 July 2016 and reported on 14 July 2016, revealed a persistent unfolding of the thoracic aorta.[92] Professor Kelly explained that she saw this as a stable finding which the radiologist had compared to a chest x-ray undertaken in February 2016, during Mrs Coats' admission following a fall. Professor Kelly also referred to the chest x-ray undertaken in 2011 which reported a similar finding. Professor Kelly's evidence was that the persistence of the finding was reassuring and would not have prompted her to further investigate.[93]

10.7. Dr Goldstein was less forgiving of the finding at x-ray not being investigated further. He stated the finding of an unfolding aorta was an abnormality and when seen in the context of a new feature, the sharp episode of pain with a sudden onset, a line should have been drawn between the two.[94] Dr Goldstein did qualify his evidence by pointing out that he had the benefit of a career involved in treating aortic dissection as opposed to ED doctors who rarely saw one.[95] Dr Goldstein gave this evidence:

> 'I think the problem lies there that, you know, if you don't think about it you'd never make the diagnosis and I think that's what happens with a large number of aortic dissections until its finally diagnosed in some other way.' [96]

10.8. As already established, there was no evidence that Mrs Coats provided a history of her dilated aorta to the QEH clinicians. The EPAS notes did not record the dilated aorta on her active medical history, unlike her other cardiac complaints. Contained within the paper based notes, which the QEH were in the process of moving away from, was information relating to this condition. Dr Goh expressed his frustration that this was relevant information at the fingertips of the clinicians and yet it was not accessed. Professor Kelly, who has worked in an ED setting for many decades, was less critical. While Professor Kelly was confident that if the material had been seen by a senior ED doctor it would have raised aortic dissection as a serious differential diagnosis requiring exclusion, she did not see it as feasible for treating doctors to trawl through large

[92] Exhibit C6b, page 68; Unfolding of an aorta is a radiological abnormality which can reflect aortic dilatation
[93] Transcript, page 39
[94] Transcript, pages 165-166
[95] Ibid
[96] Ibid

volumes of previous admissions and correspondence, just in case they contained a useful piece of information.[97]

10.9. Professor Kelly was not critical of the fact that clinicians had not made contact with Mrs Coats' cardiologist during her first admission. As Mrs Coats' back pain was not being investigated as a cardiac cause, Professor Kelly did not see this contact as vital. As indicated above, Professor Kelly did not think it unreasonable to suspect a lower thoracic spinal injury when seen in the context of spinal degeneration on x-ray and the history of the emergence of pain (driving over a speed hump).

10.10. Professor Kelly and Dr Goldstein were critical of the high blood pressure readings during this admission which triggered deteriorating patient alerts.[98] Professor Kelly told the Court that she would have liked clinicians to have considered whether Mrs Coats needed additional medication or an increase in her existing anti-hypertensive medication. Dr Goldstein agreed. He did however temper this evidence with the observation that Mrs Coats' history suggested a level of refractory hypertension which was difficult to control and required different medications at different times to manage it.[99]

10.11. Professor Kelly was not confident that Mrs Coats' pain was under control when she was discharged on 16 July 2016. Professor Kelly's evidence was that on the day of Mrs Coats' discharge, nursing staff had noted that Mrs Coats' pain was better, but she was still requiring some fentanyl. Professor Kelly's concern was that if her pain was such that she still required fentanyl, she should not have been discharged, and particularly should not have been discharged without any type of strong painkillers for her to take at home, as she was.[100] Dr Goldstein gave similar evidence. He noted the difficulty the clinicians had finding a pain medication that did not make Mrs Coats nauseous and vomit, and commented that sending her home on the background of those difficulties, with no pain relief, was overly optimistic.[101]

[97] Exhibit C12a, page 18
[98] Exhibit C6b, pages 147-148
[99] Transcript, page 171
[100] Transcript, page 37
[101] Transcript, page 206

11. Mrs Coats' second admission 20 July to 23 July 2016

11.1. As outlined above, on 20 July 2016 Mrs Coats was sent back to the QEH ED by her GP, Dr Isaac, after she presented to his clinic in a confused state complaining of back pain with vomiting and malaise. The letter Dr Isaac gave to Mrs Coats to take to the ED did not appear in the QEH electronic records for this admission. The Harbour Medical Records reflected that Dr Isaac saw Mrs Coats at 2:34pm. The SAAS records reflected that Mrs Coats arrived at the QEH ED from her home address approximately 7:35pm.[102] It is entirely plausible that due to her level of pain and exhaustion that Mrs Coats left the letter at home after returning from the GP. In any event, Professor Kelly was not convinced that a more junior ED doctor would make the connection between the back pain and the dilated aorta, even if the letter had been presented to ED staff.

11.2. During this admission Mrs Coats' renal function was noted to be deranged which was thought to be secondary to vomiting and nausea. It was noted that Mrs Coats' inflammatory marker, C-Reactive Protein Level (CRP) was raised, and she was subsequently treated with antibiotics for a urinary tract infection (UTI). Professor Kelly was of the view that there were reasonable attempts to look for an infective process and attempts to find a cause for her nausea and vomiting. These tests included an abdominal ultrasound for liver or gallbladder causes. A stomach ulcer was also investigated.

11.3. Part of the treatment for acute kidney injury saw her anti-hypertensive (perindopril) and her anti-coagulant (rivaroxaban) medications stopped due to their potential nephrotoxicity. Professor Kelly opined that it was appropriate to cease both medications in light of renal impairment but that another more suitable anti-hypertensive should have been commenced, even in the absence of the knowledge of aortic dilatation or dissection.[103] Professor Kelly noted Mrs Coats' significantly elevated blood pressure readings during this admission and did not think it adequate to wait until the renal function had improved to medically control her blood pressure. Dr Goldstein strongly shared this view, stating that notwithstanding Mrs Coats' chronic hypertension, ceasing the perindopril and not replacing it made the control of her high blood pressure '*impossible*'.[104]

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[102] Exhibit C36d
[103] Transcript, page 72
[104] Transcript, page 174

11.4. While acute kidney injury was a serious condition, there was evidence of symptomatic improvement during the course of Mrs Coats' second admission. This improvement provided the basis for Mrs Coats' discharge from the hospital.[105] While there was some level of renal dysfunction remaining, there was no reasonable explanation for the failure to prescribe a different anti-hypertensive medication. As touched upon earlier in the finding, Mrs Coats had a known history of hypertension, ischaemic heart disease, and cerebrovascular accident. In light of this medical history, in relation to the management of blood pressure alone, it was incumbent upon those discharging Mrs Coats from the hospital to have ensured her blood pressure was controlled. This did not occur.

11.5. While the records reflected that the primary concern was Mrs Coats' three-day history of nausea and vomiting and associated acute kidney injury, Mrs Coats also complained that she continued to experience back pain, with some migration of pain to her shoulders.[106] On 24 July 2016, just before discharge, Mrs Coats was recorded as telling Dr Tan and team that her back pain had been her ongoing concern.[107] Underneath this entry is a further entry observing that the '*history is inconsistent*'.[108] Professor Kelly commented that upon review of the case notes, she observed a disconnect between the clinical records and Mrs Coats' reports of pain. Ms Sally Giles of counsel assisting asked Professor Kelly this question:

> 'Q. … were there other diagnoses that should have been considered during this presentation that weren't considered.
>
> A. I think there was a disconnect between the clinical record and Mrs Coats' reports of what her major problems was. The clinical records seem to focus on the acute kidney injury, nausea and vomiting with back pain considered to be a sort of stable thing in the background, whereas, I think, Mrs Coats thought of it quite differently and felt that the pain was the main issue and that the nausea and vomiting was sort of part of the same problem. So the doctors, clinicians, have chased down the nausea, vomiting, kidney impairment rather than the back pain part. It would have been preferable if they had undertaken some more tests to look into the back pain at that time but they were somewhat constrained by Mrs Coats' poor kidney function.' [109]

11.6. It is telling that the discharge summary did not include any reference to Mrs Coats' back pain at all, thereby supporting Professor Kelly's observation that this was not the focus. The second admission was the point at which Professor Kelly considered that other

[105] Exhibit C7, pages 31-36
[106] Exhibit C6c, page 47
[107] Exhibit C6c, page 21
[108] Exhibit C6a, page 21
[109] Transcript, pages 73-74

causes for her back pain should have been investigated, even if aortic dissection was not reasonably on the differential diagnosis list.[110]

11.7. Mrs Coats' daughter, Ms Pretty also expressed her frustration in relation to the disconnect between her mother's complaints of pain and the treatment she received at the QEH in July 2016. By way of email to the Court dated 28 September 2016, Ms Pretty set out her concerns in relation to her mother being sent home on two occasions in pain and without a definitive diagnosis.[111] This email was sent in response to Ms Pretty, as senior next of kin, having received Mrs Coats' provisional cause of death. To lend weight to the severity of her concerns, Ms Pretty attached emails that she had sent to a friend who was a registered nurse, asking for guidance with the clinicians caring for her mother during the period she was an inpatient at the QEH in July 2016.

11.8. In her email, Ms Pretty described her mother prior to July 2016 as an independent woman who drove a motor vehicle and was active in the community. Ms Pretty reported that Mrs Coats assisted in the care of her youngest son aged 10, whom she picked up from school several times a week. Mrs Coats was enjoying her mobility after a good recovery from her fall in February 2016.

11.9. Ms Pretty described accompanying her mother to the QEH on 13 July 2016 and reportedly spending some time explaining to ED staff the circumstances surrounding her mother's presentation as well as her medical history. Ms Pretty observed the staff were struggling with a '*new database*' that had recently been introduced. This was no doubt the EPAS software.

11.10. Ms Pretty recalled a lack of communication with staff over the course of the three admissions and expressed frustration that Mrs Coats was discharged twice without a firm diagnosis and still experiencing a level of pain. Ms Pretty raised these concerns as her mother was struggling to cope at home in between these admissions, due to her pain, vomiting and nausea, and not because she was an elderly woman. Ms Pretty was left with a sense that the doctors did not believe there was anything seriously wrong with her mother other than age related ailments and recalled some rather distressing comments that were reportedly made by the nursing staff.

[110] Transcript, page 61
[111] Exhibit C15

11.11. There can be no doubt that Mrs Coats was struggling with her pain and a number of other issues, some of which were not related to aortic dissection. This would have been very difficult and distressing for Mrs Coats and Ms Pretty. A compounding feature was the lack of diagnosis in Mrs Coats' lifetime. It was evident from entries in the electronic notes that Ms Pretty did her best to advocate on behalf of her mother whilst in hospital and support her as best she could in between hospital admissions. I acknowledge the grief that Ms Pretty expressed in her email, in particular the last few days of Mrs Coats' life where Ms Pretty observed her mother to be in pain and distress.

11.12. While Professor Kelly and Dr Goldstein did not point to a specific failure to diagnose Mrs Coats with aortic dissection, I understood them both to express a view that the treating clinicians did not do enough to investigate the cause of her pain. It is difficult to resist the impression that Mrs Coats' age and comorbidities clouded the investigation process to a degree.

12. Mrs Coats' third admission 28 July to 2 August 2016

12.1. Mrs Coats presented for the third time by ambulance to the QEH ED on 28 July 2016. Musculoskeletal back pain was the primary complaint recorded in the triage entry of the electronic notes. This record also reflected that the pain was ongoing radiating to shoulders and abdomen with occasional shortness of breath.[112] It was noted in this entry, and other triage notes, that Mrs Coats had presented on two occasions over the last three weeks for a similar complaint as well as other symptoms. Professor Kelly was asked whether the description of the back pain radiating to the shoulders and abdomen should have raised suspicion of aortic dissection. Her opinion was the chronicity of the pain (the fact that it had been ongoing for approximately three weeks) made it less likely to be aortic dissection. Mrs Coats also complained of right upper quadrant abdominal pain, which Professor Kelly stated was 'quite atypical' of aortic dissection.[113]

12.2. Mrs Coats was admitted to the hospital with the reasons for admission recorded as ongoing urinary symptoms (incontinence/urgency), decreased oral intake, lethargy, poor mobility, and intermittent back pain. Blood tests revealed a raised CRP of 200 despite the antibiotics that Mrs Coats had been prescribed during the last admission.

[112] Exhibit C6d, page 24
[113] Transcript, page 86

The recorded assessment was partially treated urinary tract infection versus another source of infection. The admission entry specifically considered the cause of ongoing back pain and queried discitis although this was noted to be unlikely, due to lack of pain and tenderness on the palpation of her spine.[114] A bone scan was tentatively ordered.

12.3. On 29 July 2016, Mrs Coats reported feeling full in her stomach, with early satiety. Her back pain had improved slightly but she reported that she still did not feel well within herself. Repeat bloods revealed that her renal function was improving, and a bone scan was to be performed.[115] The following day, Mrs Coats described feeling increasingly nauseous over the last few weeks with severe burning epigastric pain which radiated up and into her back.[116]

12.4. On 1 August 2016, Mrs Coats underwent a bone scan and CT of her abdomen and pelvis. Neither investigation yielded an explanation for the back pain.[117] Professor Kelly was of the view that even though Mrs Coats' presenting symptoms would not have triggered a suspicion of aortic dissection, there was a lack of focus on an acute cause for her back pain. Based on the tests ordered, she was of the view that clinicians were looking for a chronic cause for her pain. Further, she was concerned that the back pain did not feature on the active problems list, suggesting that once again it was not a focus.[118]

12.5. On 2 August 2016, an entry in the records reflected that Mrs Coats was '*likely ready for discharge tomorrow from a medical point of view*'.[119] As there had been no explanation for the back pain or the abdominal pain, Professor Kelly held the opinion that Mrs Coats was not ready for discharge.[120] Additionally, there was no explanation for the drop in Mrs Coats' haemoglobin between 30 July and 1 August 2016, which Professor Kelly quantified as approximately a unit and a half of blood.[121] Professor Kelly would not have wanted Mrs Coats discharged until the source of the bleeding had

[114] Exhibit C6d, page 35
[115] Ibid, page 50-51
[116] Ibid, page 54
[117] Transcript, page 94
[118] Transcript, page 90
[119] Exhibit C6d, page 74
[120] Transcript, page 99
[121] Transcript, page 105

been identified. She did concede however that acute blood loss of this nature would not have raised a suspicion of aortic dissection.[122]

12.6. While Dr Goldstein was of the view that the fall in haemoglobin was not related to the aortic dissection,[123] he also queried why it was not investigated. Dr Goldstein gave evidence that once a laboratory variation had been ruled out, an explanation for a significant drop such as this required further elucidation which did not take place. He said:

> 'You need to come up with an explanation for that drop in haemoglobin and even if you have thought that one of the differential diagnoses was aortic dissection, which of course wasn't the case, but even if you have thought that, it wouldn't explain the drop of haemoglobin, so some other cause has done it and that was never really elucidated.'[124]

12.7. Both Professor Kelly and Dr Goldstein were critical of Mrs Coats' uncontrolled hypertension which saw several warnings lodged through the deteriorating patient system during the third admission.[125] As canvassed at length in this finding, they both held the opinion that the failure to institute an alternative blood pressure medication that was not contraindicated with renal impairment, was a deficiency in her care at the QEH.

12.8. Professor Kelly told the Court that it would have been preferable for those treating Mrs Coats to have made contact with her GP, particularly during the third presentation. She gave this evidence:

> 'The more times [Mrs Coats] presented to the hospital and the longer the problems continued the more important it was to seek all the information available that might help them make a diagnosis.'[126]

12.9. Dr Goldstein gave this evidence:

> '…..the various blood tests… were out of keeping with any of the diagnoses postulated. It really requires somebody, a senior somebody I would have thought, to say 'look, we don't know what's going on here, but we haven't really nailed the diagnosis here', and this is literally what people would say, 'there must be something else going on.' [127]

[122] Ibid
[123] Transcript, page 179
[124] Transcript, page 183
[125] Exhibit C6d, pages 211, 212, 215
[126] Transcript, page 107
[127] Transcript, pages 198-199

12.10. On 2 August 2016 at 9:22am the electronic records reflected that Mrs Coats complained of severe shoulder pain which she described as intense pain. She was observed to be very distressed. Shortly after that entry, a medical emergency response note with the time stamp of 9:59am recorded that Mrs Coats had been found collapsed on the toilet floor. Mrs Coats had apparently asked to use the toilet and asked the nurse who assisted her for some privacy. Upon the nurse's return, Mrs Coats was found on the floor with a bleeding laceration to her head. A Code Blue was called and resuscitation performed, limited to Mrs Coats resuscitation preferences. She was pronounced life extinct at 9:47am.

13. Timing of aortic dissection and preventability

13.1. As Mrs Coats had presented three times to the QEH in a short space of time, with a number of different symptoms, the question arose whether some or all of the symptoms were caused by aortic dissection. By way of pathological findings, Dr Neil Langlois noted that there was a 1cm transverse tear on the inferior surface arch of the aorta which was 4cm distal to the subclavian origin leading to the dissection. The dissection extended proximally into the pericardial sac with rupture on the right side of the aorta, 1.5cm above the aortic valve root. While the tear was not located where the dilation was noted at echocardiogram (either ascending aorta or aortic arch), the dissection extended into the dilated area and resulted in the rupture causing haemopericardium. The pericardium contained 779 grams of blood with post-mortem clot.

13.2. Dr Langlois noted that an examination of samples of the dissection under the microscope revealed a healing reaction with the presence of iron (from the breakdown of blood), indicating that the dissection was of at least a few days duration.[128] This fit with Dr Goldstein's evidence in relation to the sequence of events as he understood them to be. He told the Court that he was confident that the dissection started on the day of the first admission as the symptoms of back pain, nausea, and vomiting fit very well with an acute aortic dissection.[129] The subsequent symptoms suggested a sub-acute extension of the dissection, culminating in rupture of the ascending aorta into the pericardium causing immediate tamponade and death (the third admission to the QEH).[130]

[128] Exhibit C2a, page 2
[129] Transcript, pages 161, 194
[130] Exhibit C14a, page 7

13.3. Dr Goldstein was also of the view that the documented uncontrolled hypertension during the third admission to the QEH would almost certainly have contributed to the extension of the dissection.[131] Dr Goldstein stated that the unusually long period between first tear and final rupture could easily be explained by saying that the initial tear was a relatively localised dissection and then it extended.[132] Whether the initial tear remained or extended bit by bit between the first and third admission, Dr Goldstein was unable to say.

13.4. Professor Kelly shared Dr Goldstein's opinion that Mrs Coats' symptoms during her first presentation on 13 July 2016 were attributable to aortic dissection. She gave this evidence stating it was with the benefit of hindsight.[133] She also agreed Mrs Coats' uncontrolled hypertension contributed to the final fatal extension of the tear leading to haemopericardium.[134]

13.5. Dr Goldstein was asked whether, on balance, Mrs Coats' death was preventable. After some rumination, he told the Court that he did not think Mrs Coats' death was preventable. I understood Dr Goldstein's opinion to be based on the high-risk nature of the surgery, given a combination of the location of the dissection and Mrs Coats' age and comorbid state. Dr Goldstein explained that the dissection involved the arch of the aorta and extended proximally back towards the heart. Accordingly, the arch and the ascending aorta would have to be replaced and possibly a portion of the descending aorta as well. The difficulty with replacing the arch would be preserving the blood supply from the three main arteries that branch off from the arch. Dr Goldstein called this procedure, '*the largest of the procedures*' to repair a dissection.[135] Dr Goldstein placed Mrs Coats' mortality risk in the 60-70% category. Leaving aside Mrs Coats' active medical conditions, her age, and the location of the tear, Dr Goldstein made it clear that once a dissection had occurred, surgical intervention carried an inherently high mortality rate.[136]

[131] Exhibit C14a, page 7
[132] Transcript, page 161
[133] Transcript, page 54
[134] Transcript, page 72
[135] Transcript, page 190
[136] Transcript, pages 188-189

14. Conclusions

14.1. Mrs Coats' presentations in July 2016 did not enliven the ACS Pathway. Based on the first presentation and Mrs Coats' description of the onset of pain, the expert witnesses were not critical of this. Had the ACS Pathway been applied (as it was with Mrs West and Mrs D'Souza), it is not certain whether aortic dissection would have been considered, as it was not a differential diagnosis on the ACS Pathway in the QEH ED. With that said however, when Mrs Coats presented in 2011 with chest pain and a cardiac cause was suspected, clinicians did turn their minds to the possibility of aortic dissection. An aortogram was performed and aortic dissection ruled out.

14.2. If clinicians had known of Mrs Coats' aortic dilatation, Professor Kelly was of the view that this would have prompted investigations such as a CT scan or aortogram. Dr Goldstein opined that the initial sharp and severe pain suffered by Mrs Coats was the first tear in the aorta and coincidentally occurred as she was travelling over the speed hump. It irresistibly follows that if investigations had been undertaken to examine the aorta (such as an aortogram) during any one of the admissions to the QEH in July 2016, the tear would have been discovered. However, taking each admission in isolation, Professor Kelly was not critical of the investigations undertaken or the overall management of Mrs Coats. Professor Kelly did not point to a particular investigation that should have been undertaken that would have reasonably led to a diagnosis of aortic dissection during the course of the three admissions. What is clear is that with each presentation, and the introduction of new symptoms, the likelihood of a targeted diagnosis of aortic dissection became more and more remote.

14.3. Even if the aortic tear had been discovered in time to surgically intervene, Dr Goldstein was not optimistic about Mrs Coats' prospects, given her comorbidities. The location of the tear (involving the aortic arch) would have made the surgery more complicated and placed her at a very high risk of mortality (60-70%).[137]

14.4. With that said, it is unsatisfactory that a woman who had lived independently in the community presented on three occasions in three weeks to the same hospital with a constellation of unexplained symptoms without any demonstrable effort to obtain collateral information from, at the very least, her treating GP. This is particularly so by the third admission on 28 July 2016. This was in stark contrast to Mrs Coats' February

[137] Transcript, page 190

2016 admission where ED clinicians contacted her GP to seek information about her diagnosis of atrial fibrillation in the context of her anticoagulation medication, following a fall.

14.5. Mrs Coats' blood pressure management was another unsatisfactory area of her care at the QEH in July 2016. Dr Goldstein was of the view that the uncontrolled hypertension almost certainly contributed to the extension of the initial tear in the aorta, ultimately leading to rupture into the pericardial space. This evidence is supported by Dr Langlois' opinions expressed in his post-mortem report insofar as there was pathological evidence of changes in the kidneys which were in keeping with chronic hypertension.

14.6. Professor Kelly was critical of the failure to institute an alternative anti-hypertensive medication when perindopril was ceased due to Mrs Coats' renal dysfunction. This was particularly so in light of the numerous alerts for high blood pressure, over the second and third admissions. While there was no clinical nexus between the high blood pressure and aortic dissection in the minds of those treating Mrs Coats in July 2016, there was nonetheless a very worrying pattern of hypertension that went untreated.

14.7. It is for the foregoing reasons that I make the following findings in respect of Mrs Coats:

- Mrs Coats was an independently living woman of 73 years of age.
- Mrs Coats suffered chest pain in 2011 which revealed triple vessel coronary artery disease for which she came under the management of a cardiologist.
- The investigations undertaken by her initial cardiologist revealed a dilated aorta (both arch and ascending) for which she was monitored.
- When Mrs Coats came under the care of Dr Goh, she was managed to a high standard.
- While Mrs Coats' fall in February 2016 and subsequent admission to the QEH represented an opportunity for written communications from her cardiologist (detailing the aortic dilatation) to be noted by clinicians in July 2016, I am of the view that it was not reasonable for clinicians to have looked through the case notes given Mrs Coats' description of her pain and the apparent cause of it.
- It was not unreasonable for clinicians at the ED to have come to the diagnosis of acute on chronic exacerbation of degenerative spinal disease, based on the history of the onset of pain and the findings on x-ray.

- The finding of an unfolding thoracic aorta was reassuring to clinicians due to the report of its persistence from February 2016, and therefore did not warrant further investigation.
- While the changeover from paper based notes to the EPAS software impacted on a fulsome medical history being identified in July 2016, it did not contribute to Mrs Coats' death.
- There was no obligation on the part of the clinicians at QEH to make contact with Dr Goh during Mrs Coats' admissions given the suspected cause of her pain being non-cardiac.
- Mrs Coats was discharged appropriately after the first admission, but that more attention should have been paid to her ability to cope at home, including pain management.
- Mrs Coats' care during her second admission was appropriate insofar as it was reasonable not to have investigated aortic dissection, given her presentation.
- The cessation of perindopril was appropriate in the face of renal dysfunction, but it was vital that an alternative blood pressure medication be instituted on discharge during her second admission or during the third admission, given her persistent hypertensive state. This did not occur.
- The symptoms that Mrs Coats presented with on her third admission were not clinically indicative of aortic dissection.
- By the third admission, insufficient attention was given to Mrs Coats' re-presentations and the reasons behind them.
- Collateral information should have been sought during the third admission from Mrs Coats' treating GP.
- Mrs Coats had uncontrolled hypertension during all three admissions in July 2016.
- The initial tear to Mrs Coats' aorta occurred on 13 July 2016 and fatally ruptured on 2 August 2016.
- A contributory factor in the final rupture was Mrs Coats' uncontrolled blood pressure after the cessation of perindopril on 20 July 2016.

- Taking into account Mrs Coats' multiple cardiac comorbidities and the location of the dissection, Mrs Coats' death was on balance not preventable in all the circumstances.

15. Mrs Heather Maud West

15.1. Mrs West lived with her husband in Kidman Park, South Australia. She had a past medical history including atrial fibrillation, previous ischaemic stroke, rheumatoid arthritis, left total knee replacement, left ventricular impairment, gastroesophageal reflux disease and recurrent urinary tract infections.

15.2. On the morning of 2 May 2017, Mrs West experienced symptoms of central chest pain after showering. She was conveyed to the QEH ED by SAAS, arriving at 9:16am. Paramedics administered GTN spray[138] and aspirin, no doubt suspecting Mrs West was suffering from acute coronary syndrome.

15.3. Once at the QEH, the triage entry reflected that Mrs West complained of not only chest pain, but of chest tightness which had radiated to her back since 8:30am. The GTN spray and aspirin had reportedly given her some relief.[139]

15.4. It is clear from the clinical records that the ACS Pathway was applied by ED intern Dr Andrea Lyon, with an ECG being undertaken at 9:26am, a chest x-ray at 9:52am, and repeat troponins within a six-hour period, at 9:45am and 3pm. The clinical information on the radiology request form was recorded as '*presents with central chest pain + light-headedness this AM. PMHx for AF and ischaemic stroke. ?acute lung/cardiac pathology*'.[140]

15.5. At 3:31pm Dr Lyon recorded a description from Mrs West as:

> 'Drying herself in the shower she lifted her leg and felt lightheaded … As such she went to bedroom to lie down and developed central chest pain radiating to the right upper back, aching 6-7 [in pain score], lasted 2-3 minutes. Different in character to reflux.' [141]

[138] Glyceryl Trinitrate
[139] Exhibit C24, page 69
[140] Exhibit C24, page 106
[141] Exhibit C24, page 76

It was recorded by Dr Lyon that after six hours of observations, Mrs West had a normal troponin, the ECG showed no dynamic changes and the chest x-ray, reported on by radiology registrar, Dr Ayesha Karunatillake, revealed cardiomegaly but no acute pathology.

15.6. Dr Lyon's entry recorded her impression as:

> 'Non cardiac chest pain. At time 6 hour trop patient says pain now feels like reflux, relieved by Mylanta'.[142]

The actions recorded were:

> 'observed with 6 hour trop and ECG → results unremarkable'.[143]

Mrs West was discharged at approximately 4pm and referred to her regular cardiologist, Dr Waddy.

15.7. A statement taken from Mrs West's daughter, Ms Lorrae West,[144] described Mrs West as complaining of abdominal pain and appearing uncomfortable upon her return home. A party had been organised for Mrs West's husband that evening and family were in attendance. Mrs West did not join her family at the dinner table but rested on a couch nearby. Mrs West's daughter suggested that she go to bed after dinner, to which she agreed. When Mrs West went to bed, her daughter (who lay with her) noticed that she was breathing heavily. Mrs West's ears and lips were observed to turn blue and when trying to stand up, she fell from the bed.

15.8. Mrs West's family contacted SAAS at 8:41pm. They arrived at the Kidman Park premises at 8:50pm.[145] The Ambulance Patient Report Form (APRF) reflected Mrs West was agitated, short of breath with lip cyanosis. The history of Mrs West attending the QEH earlier in the day was recorded with family reporting that this was for abdominal pain radiating to her back. Mrs West was hypotensive with a blood pressure reading of $^{90}/_{70}$ and tachycardic, with a heart rate of 152. A consideration of intravenous administration of midazolam for anxiety was noted on the APRF, but decided against due to hypotension. Mrs West was conveyed back to the QEH ED.

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[142] Exhibit C24, page 77
[143] Ibid
[144] Exhibit C19a
[145] Exhibit C25, page 16

15.9. Upon return to the ED at 9:43pm, Mrs West was recorded to be in rapid atrial fibrillation, with a heart rate of 150 beats per minute. Her blood pressure was not able to be recorded and she was noted to be cyanotic. Shortly after arrival, Mrs West went into cardiac arrest. The records reflected that resuscitation efforts commenced at 9:49pm with adrenaline administered at 9:52pm and 9:57pm and an anti-arrhythmic medication, amiodarone, given at 10pm. Efforts to resuscitate Mrs West were unsuccessful and she was pronounced life extinct at 10:08pm on 2 May 2017.

16. The x-ray

16.1. The following day, Dr Gary Croft, QEH consultant radiologist, reviewed Mrs West's x-ray films that had been reported on by the radiology registrar, Dr Karunatillake. Dr Croft, in an affidavit dated 19 June 2019 and tendered to the Court, stated that this was part of his usual checking system to verify the registrar's report,[146] albeit somewhat delayed. When Dr Croft came to examine the film, he stated that he was aware that Mrs West had died as he saw this information in the dialogue box. Notwithstanding this knowledge, he reviewed the film and reported a '*possible pericardial stripe ?Pericardial effusion*'.[147]

16.2. Dr Croft stated that he had looked for a pericardial stripe when he noticed a difference in Mrs West's heart shape from a previous x-ray. Her heart appeared bigger and more globular.[148] Dr Croft stated that a pericardial stripe is the radiological sign for a pericardial effusion which is fluid in the pericardial sac around the heart. An x-ray would not differentiate between serous fluid or blood. This potential finding was not recognised by the radiology registrar the day before when Mrs West was in the ED. Dr Croft noted that a pericardial stripe was not an 'easy thing to diagnose' and that he was not certain of the finding at the time he reviewed the film.[149]

16.3. Dr Croft was unable to explain why the x-ray had not been reviewed by the consultant on duty the same day as the film was taken. Dr Croft speculated that high workload may have been a contributing factor. The usual practice would be that the review would be conducted the same day if the patient presented within business hours, which Mrs West did. Dr Croft was aware, through the Safety Learning System (SLS)

[146] Exhibit C22, paragraph 14, page 4
[147] Exhibit C22, paragraph 15, page 5
[148] Ibid
[149] Exhibit C22, paragraph 15, page 5

notification for Mrs West[150], that the clinical information obtained in the ED included Mrs West's pain 'radiating to the back'. Dr Croft gave this evidence:

> 'As soon as I read that the pain 'radiated to the back', and knowing that Mrs West had passed away, even before reviewing the x-ray, I thought it was likely that she had an aortic dissection. That specific information wasn't on the clinical detail that was provided on the imaging request. It may have made no difference to this lady as the pericardial stripe I identified indicates a pericardial effusion, but it highlights how clinical information can be critical in how a radiologist interprets findings on the x-ray.'[151]

16.4. Dr Croft stated that he had reviewed Mrs West's film on the morning of her presentation to the QEH ED, he would have made a change to the registrar's report and contacted the requesting doctor to discuss his findings.[152] The requesting doctor was Dr Lyon, who reviewed Mrs West before she was discharged at approximately 3:15pm on 2 May 2017. As he was aware Mrs West had died, he just made an amendment to the report at 11:34am on 3 May 2017.[153]

17. Dr Andrea Lyon

17.1. An affidavit was obtained from Dr Lyon on 23 January 2019 and tendered to the Court when Mrs West's death was joined to the inquest.[154] Dr Lyon had been provided with the EPAS records for Mrs West's two presentations to the ED on 2 May 2017, and acknowledged in her affidavit that she was the treating clinician on the first occasion. At that time, Dr Lyon was in her intern year which meant she was undertaking her first year of medical practice after graduating from medical school.

17.2. Dr Lyon did not remember Mrs West at the time of giving her affidavit. Curiously, Dr Lyon was unaware that Mrs West had returned to the same hospital within six hours of discharge and died. This was notwithstanding an SLS report being raised the day after Mrs West's death.[155] In her affidavit, Dr Lyon accepted that she reviewed Mrs West, ordered several routine tests including the x-ray, and then made an entry in the EPAS recording 'no acute changes' on the x-ray. Dr Lyon was unable to remember whether she viewed the x-ray report or the film or both. Dr Lyon referred to her normal practice of discussions with supervisors about further treatment while reviewing the x-

[150] Exhibit C34
[151] Exhibit C22, paragraph 22, page 7
[152] Exhibit C22, paragraph 19, page 6
[153] Ibid
[154] Exhibit C21
[155] The cause of death was not known at this time

ray, as well as consultation with supervisors to make the decision to discharge Mrs West home.

17.3. It is unclear what level of supervision Dr Lyon, as a junior doctor, was operating under on the day of Mrs West's presentation. There was no entry in the electronic notes that recorded the involvement of a more senior doctor or that Dr Lyon sought guidance from a senior doctor about the results of the investigations. That is not to say it did not happen, just that there was no evidence of it taking place. What is clear is that Dr Lyon followed the ACS Pathway and if Mrs West was having an acute coronary episode, it would undoubtedly have been diagnosed. Unfortunately, that was not the case.

17.4. It was not necessary to call Dr Lyon to give oral evidence as the expert evidence on Mrs West's ED presentation was not challenged. An affidavit from Dr Tom Soulsby was obtained by those representing CALHN and tendered to the Court.[156] Dr Soulsby gave this affidavit in his capacity as a medical lead in Acute and Urgent Care at CAHLN, and an emergency physician with some twenty-two years' experience. Dr Soulsby's affidavit was largely dedicated to the opinions expressed by Professor Kelly in relation to Mrs D'Souza and her proposed recommendations. He did however briefly comment on the management of Mrs West at the QEH ED, stating '*…with pain radiating to the back, there should have been a consideration of aortic dissection*'.[157] In her evidence, Professor Kelly went further than this, but I did not understand Dr Soulsby to disagree with any of the opinions she expressed in respect of Mrs West.

17.5. Professor Kelly's evidence was that given back pain was a prominent feature in Mrs West's presenting symptoms, aortic dissection should have been included in the differential diagnosis. Further, it was inappropriate to discharge Mrs West from the ED without having investigated aortic dissection. Finally, had the consultant radiologist reviewed the x-ray film and reported on it while Mrs West was still in the ED on the first occasion, it would have seen aortic dissection '*rocket to the top of the diagnostic list*'.[158]

17.6. Professor Kelly was not overly critical of the delay in the consultant review of the x-ray films, however. Professor Kelly stated that the practice of radiology consultant reviews taking place within a 24-hour time frame was commonplace and in some hospitals was

[156] Exhibit C29
[157] Exhibit C29, page 4
[158] Transcript, page 337

longer. She expressed the view that it would be preferable for consultant review of x-ray reports for ED patients ideally occurring while the patients were in the ED, however this was not always feasible due to workloads.

17.7. When asked for her opinion as to whether Mrs West's death was preventable, Professor Kelly indicated that this was outside her field of expertise, however she noted that there was a period of hours between the initial ED presentation and Mrs West's death, which would have afforded an opportunity for consultation with cardiothoracic specialist and interhospital transfers.[159]

17.8. Given the potential window of surgical opportunity in Mrs West's case, Dr Goldstein was asked to prepare a further report in relation to Mrs West from his perspective as a cardiothoracic surgeon.[160] While Mrs West was elderly and suffered a number of comorbidities, Dr Goldstein stated that the major risk factor related to the extent of surgery needed to correct the dissection. Dr Goldstein noted that at autopsy the extent of the aortic involvement was '*a segment of dissection within the ascending aorta, which had emanated from a tear in the intima around 3.5 centimetres above the sino-tubular junction*'.[161] The significance of this finding for Dr Goldstein was that the dissection was limited to the ascending aorta only. Without involvement of the aortic root or transverse arch/descending aorta this correlated to a low operative mortality of between 5-10%.[162]

17.9. While there was some disagreement about the exact percentage of the operative mortality given Mrs West's age and comorbidity, counsel for CAHLN accepted that on balance, Mrs West would have survived a surgical repair, had aortic dissection been diagnosed.[163] Accordingly, Dr Goldstein was not called again to give oral evidence.

18. Conclusions

18.1. Mrs West presented with what had been described during the inquest as a classic sign of aortic dissection, central chest pain radiating to her back. There can be no doubt that Dr Lyon did not turn her mind to the possibility of aortic dissection when she treated

[159] Transcript, page 340
[160] Exhibit C32
[161] Exhibit C20a, page 2
[162] Exhibit C32, page 4
[163] Transcript, page 415

Mrs West. This was supported by the absence of any reference to aortic dissection in the clinical records and the absence of back pain in the clinical information on the x-ray request form. Given the rarity of aortic dissection and Dr Lyon's inexperience, I am not critical of Dr Lyon individually, in her failure to suspect aortic dissection. It was however indicative of the broader issue described by Professor Kelly; namely that approximately half the staff in Australian ED's are doctors who are rotating through for a matter of months, and they are often very junior and may never work in the ED again, and so they may never see a case of aortic dissection in their professional lifetime. Therefore, there needs to be a level of consultant support and continual education on the possibility of aortic dissection and how it may present.

18.2. Ultimately, it was a culmination of factors that operated against a positive diagnosis of aortic dissection in relation to Ms West. Firstly, there was a failure to appreciate the clinical significance of the back pain. Secondly, the radiology registrar who initially reviewed the x-ray film did not identify the pericardial stripe. Thirdly, there was no consultant review of the radiology registrar's report while Mrs West was in the ED, noting that she was there for approximately six hours and these hours fell within the working day. Mrs West was discharged home after acute coronary syndrome was ruled out without consideration of other causes. Given the evidence heard and received at inquest, that aortic dissection did not feature on the QEH ED ACS Pathway, a question that exercised my mind was whether the inclusion of aortic dissection on the ACS pathway would have prompted Dr Lyon to consider it. On this point, the evidence of Dr Goldstein resonated, '*if you don't include aortic dissection [in the differential diagnosis] you are going to miss it*'.[164]

18.3. I make the following findings in respect of Mrs West:

- When Mrs West presented to the QEH ED on 2 May 2017, the ACS Pathway was applied correctly.
- When acute coronary syndrome had been ruled out, Mrs West's symptoms should have raised suspicion for aortic dissection.
- There was insufficient clinical information recorded on the x-ray request form.

[164] Transcript, page 203

- There was a delay in the consultant review of the x-ray, which ultimately revealed a finding suggestive of fluid in the pericardial space.
- If the x-ray review had taken place while Mrs West was in the ED, the identification of a pericardial stripe would have prompted more targeted investigations leading to a diagnosis of aortic dissection.
- There was sufficient time between the onset of symptoms and Mrs West's ultimate collapse to have surgically intervened or at least offered her the option of emergency surgery.
- On the balance of probabilities, Mrs West's death was preventable.

19. Mrs Lorna Margaret D'Souza

19.1. Mrs D'Souza was an 81-year-old woman who lived independently in the community. Mrs D'Souza had no known medical history and was not taking any prescribed medications.

19.2. On 26 May 2019, Mrs D'Souza was at her home in Grange when she began to feel unwell. Mrs D'Souza's niece, Ms Sandra Holland, drove to her home to check on her, arriving at approximately 4:30pm. Ms Holland, who provided an affidavit which was tendered to the Court,[165] spent some time with her aunt and then went to get dinner, arriving back at approximately 7:40pm. Mrs D'Souza complained of chest pain upon her return, so Ms Holland called an ambulance.

19.3. The ambulance was contacted at 8:13pm after Mrs D'Souza reportedly experienced left jaw pain and chest discomfort while cooking. Mrs D'Souza was given a priority 2 rating and the ambulance arrived at her home in Grange at 8:20pm. In the APRF[166] her symptoms were recorded as '*left jaw pain and right jaw pain that moved up from the sides of neck/chest*'.[167] This pain was reportedly associated with dizziness and blurry vision. It was noted that Mrs D'Souza had no past medical history of a cardiac origin, although she had a familial history. Ms Holland accompanied Mrs D'Souza in the ambulance.

[165] Exhibit C25a
[166] Exhibit C28, page 79
[167] Exhibit C28, pages 23-24

19.4. Mrs D'Souza was administered aspirin and three doses of GTN spray by the paramedics and conveyed to the QEH ED, arriving at 8:57pm. Once in the ED, the electronic note with the time stamp of 9:00pm recorded the chief complaint to be the development of:

> 'CVS, Chest pain, Developed bilateral neck and jaw pain whilst cooking pain radiated into central chest at 1600 hours – x3 sprays of GTN and aspirin given by SAAS – APS 2/10 on arrival.' [168]

19.5. Another history was provided to a medical officer, Dr Rory Maclaglan, with a time stamp of 10:42pm which recorded the history of pain as:

> 'Today at 1600pm developed sudden onset left sided chest pain radiating up into the left neck and jaw also had central pressure chest pain and xiphisternum associated dizziness and mild confusion and subjective shortness of breath.' [169]

19.6. In accordance with the ACS Pathway, Dr Maclaglan ordered a chest x-ray and a troponin test, noting that the onset of pain was at 4pm (approximately 6 hours before his examination), thereby removing the need for a second troponin test as would usually be required. An ECG had been performed on Mrs D'Souza's arrival at the ED and did not reveal any acute changes. The chest x-ray was undertaken at 9:24pm on 26 May 2019. It was not clear at what time the x-ray finding was communicated to those in ED, however the film was reported on by the radiology registrar at 10:11am on 27 May 2019 and then reviewed by a consultant radiologist at 12:04pm on 27 May 2019. This was after Mrs D'Souza had been discharged and in fact had died. In any event, there were no acute abnormalities reported by either the registrar or the consultant.

19.7. There were two entries of note by Dr Maclagan relating to Mrs D'Souza's time in the ED. The first indicated that Mrs D'Souza was to be discharged home if her tests were negative and that she would be followed up for an intermediate pathway. This pathway was the *Suspected Acute Coronary Syndrome: Intermediate Risk Referral Pathway*, which required outpatient referral and follow up. The referral form had been completed and signed by Dr Maclagan.[170] The blood results revealed a normal troponin level, and a discharge letter was prepared and given to Mrs D'Souza. It was recorded that Mrs D'Souza was advised to reattend if she deteriorated or any red flag symptoms were

[168] Exhibit C28, page 74
[169] Exhibit C28, page 78
[170] Exhibit C28, page 44

present. The second entry reflected that Mrs D'Souza underwent a physical examination which was unremarkable.

19.8. Mrs D'Souza was discharged from the ED at 12:49am on 27 May 2019. She had spent a little over three and a half hours in the ED.

19.9. After her discharge from the ED, Mrs D'Souza had been released into the care of her niece and her niece's daughter who planned to drive her home. On the journey home Mrs D'Souza, who was sitting in the backseat of the car, became unresponsive. Mrs D'Souza's niece returned to the ED where Mrs D'Souza underwent resuscitation. Unfortunately, these efforts were unsuccessful and were ceased at 1:37am. Mrs D'Souza was pronounced life extinct at 1:56am on 27 May 2019.

20. Expert opinion

20.1. Professor Kelly's opinion in relation to Mrs D'Souza's presentation to the QEH was that due to the description of the pain starting in the neck and jaw and then radiating to the chest, aortic dissection should have been considered in the differential diagnosis.[171] The description of the pain beginning in the neck and radiating to the chest was recorded twice, once in the APRF and once in the triage note. The description of the pain that Dr Maclagan recorded was slightly different, in that the pain started in the chest and radiated to the neck. Professor Kelly in her expert report stated that while subtle, it was an important difference as it made the diagnosis of a dissection of the aorta or of a neck artery much more likely.[172]

20.2. Dr Soulsby, in his affidavit, commented on this portion of Professor Kelly's report. Dr Soulsby did not agree with Professor Kelly's opinion that aortic dissection should have been suspected. He referred to the triage entry and the entry made by Dr Maclaglan as support for the pain beginning in the chest and radiating into the neck. He was of the view that this progression was more typically ischaemic than that of an aortic dissection. Dr Soulsby had not seen the APRF description at the time of providing his affidavit but stated:

> 'I think 2 of the 3 descriptions imply that the pain started in the chest and radiated to the neck /jaw.'[173]

[171] Exhibit C31, page 14
[172] Ibid
[173] Exhibit C29, page 3

20.3. Of note was a further description of Mrs D'Souza's pain that Dr Maclagan had recorded in the *Suspected Acute Coronary Syndrome: Intermediate Risk Referral Pathway Form*. This was '*left sided pressure chest pain, sudden onset with radiation up neck and into jaw with light headedness'*.[174] This was consistent with the history that he obtained from Mrs D'Souza and placed the chest pain before the neck pain.

20.4. There was little utility in resolving the opposing views of Professor Kelly and Dr Soulsby on which pain preceded the other, as neither of them took the history from Mrs D'Souza, and it was very much their individual interpretation of the records. In any event, I understood Professor Kelly's oral evidence to clarify her report by stating that if neck pain was a prominent feature, aortic dissection should have been considered. Professor Kelly explained her opinion in oral evidence that:

> 'the association of neck pain and chest pain, in my view, increases the likelihood of an arterial dissection, and particularly if that neck pain precedes the chest pain.' [175]

She said while pain beginning in the neck and moving to the chest would be of greater concern, both scenarios would concern her. Professor Kelly's evidence on this topic was not seriously challenged in cross-examination.[176]

20.5. There can be little doubt that Mrs D'Souza's complaints of pain included both chest and neck as prominent features. Another notable feature of her ED presentation was the relatively short amount of time she was in the Department before discharge. However, a matter that was agreed in evidence was that even if Mrs D'Souza's aortic dissection had been suspected and investigated, there would not have been sufficient time to surgically intervene to prevent her death.[177]

21. Incident review meeting

21.1. An incident review panel meeting was conducted by CALHN on 16 October 2019 into Mrs D'Souza's presentation to the ED and her subsequent death. The panel, consisting of seven clinicians including Dr Soulsby, were aware of Mrs D'Souza's cause of death

[174] Exhibit C28, page 44
[175] Transcript, page 360
[176] Transcript, pages 360-361
[177] Transcript, page 346

at the time, stating it was a '*missed aortic dissection'*. [178] The issues identified in the review were recorded as:

> 'Ischaemic sounding chest pain. No signs or symptoms suggestive of aortic dissection. Pain improved with GTN. Hospital guideline for ischaemic chest pain followed. No obvious omissions in Mx179.' [180]

The panel concluded that no further action was required.

21.2. The opinions expressed by Dr Soulsby in his statement aligned with the findings at the CALHN incident review panel meeting. While not specifically asked to comment on the review panel's findings, it was clear that Professor Kelly did not agree with their conclusions.

22. Conclusions

22.1. In his closing address, counsel for CALHN submitted that in her expert report, Professor Kelly had placed a degree of significance on the order in which the pain occurred, namely pain starting in the neck and then moving to the chest as being suggestive of aortic dissection. He submitted that her position had then changed in her oral evidence to suggest that chest pain in association with neck and jaw pain was a reason to consider aortic dissection.[181] As outlined above, I understood Professor Kelly to have clarified her opinion in her oral evidence by highlighting the significance of neck pain as a prominent feature that concerned her regardless of its sequence.

22.2. While I accept that aortic dissection is an area of Professor Kelly's research expertise, perhaps placing her level of knowledge on the topic above that of the usual emergency physician, it is difficult to understand how Mrs D'Souza was discharged without a firm diagnosis after only three and a half hours, even when acute coronary syndrome had been ruled out. Neck pain in conjunction with chest pain was a prominent feature of her presentation, and there was no explanation for either cause upon her discharge. I do however acknowledge the record in the electronic notes that Dr Maclaglan sought a consultant's advice before Mrs D'Souza was discharged.

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[178] Exhibit C29, Attachment 1, page 8
[179] Mx = Management
[180] Exhibit C29, Attachment 1, page 8
[181] Transcript, page 417

22.3. There was no need to be critical of Dr Maclaglan in his clinical management of Mrs D'Souza, particularly when there was documented evidence of him having sought consultant supervision and having followed a pathway which was designed to rule out acute coronary syndrome. Rather, Mrs D'Souza's death and that of Mrs Coats and Mrs West, highlighted the need for changes to the ACS Pathway, to bring the differential diagnosis to forefront of the minds of clinicians in a busy ED setting. As Dr Goldstein stated, if you are not thinking about aortic dissection, you will miss it.

22.4. It is for the foregoing reasons that I make findings in relation to the death of Mrs D'Souza as follows:

- The ACS Pathway was appropriately applied to Mrs D'Souza when she arrived at the ED of the QEH on 26 May 2019.
- Mrs D'Souza should not have been discharged from the ED without further investigations for the cause of her chest and neck pain.
- Mrs D'Souza's death was not preventable as at the time she presented to the QEH ED at approximately 9pm on 26 May 2019.

23. Acute Coronary Syndrome Pathway

23.1. The inquest heard that the QEH, which is a hospital that forms part of the CALHN, had in place at the time of the presentation of all three deceased persons an Emergency Department Pathway for Acute Coronary Syndrome[182] (the ACS Pathway). This document made reference to symptoms suggestive of acute coronary syndrome (ACS) as '*pain, pressure, heaviness, tightness in: chest, neck, jaw, arms, back, shoulders*'.[183] As already touched on above, the consideration of a provisional diagnosis of aortic dissection did not feature on this ACS Pathway.

23.2. One matter raised by Professor Kelly, particularly in relation to the deaths of Mrs West and Mrs D'Souza, was the absence of specific reference to aortic dissection in the ACS Pathway that was in place during their presentations at the ED of the QEH. While Professor Kelly readily conceded that most doctors will never see a case of aortic

[182] Exhibit C18, Emergency Department Pathway for Acute Coronary Syndrome Risk Stratification and further investigation of *Patients with suspected Acute Coronary Syndrome*
[183] Exhibit C18

dissection in their practising lifetimes, a relatively simple but effective intervention would be a chest pain evaluation pathway that explicitly includes a step to consider other life-threatening diagnoses and specifically names aortic dissection as one of them.[184]

23.3. Professor Kelly drew the Court's attention to the Australian Heart Foundation's Guidelines which state that in the context of suspected ACS, consideration of high-risk conditions such as aortic dissection and pulmonary embolism should occur immediately after/concurrent with the initial ECG[185].

23.4. Dr Goldstein gave evidence that aortic dissection must be considered as a differential diagnosis whenever there is a complaint of chest or back pain. While not given in the context of an ED protocol or pathway, Dr Goldstein's evidence was entirely consistent with Professor Kelly's on this topic.

23.5. Dr Soulsby, in his affidavit, confirmed that he accepted Professor Kelly's suggestion and agreed for it to be implemented by both the Royal Adelaide Hospital and the QEH Emergency Departments, as they both fall under the Central Adelaide Local Health Network.

24. Recommendations

24.1. Pursuant to section 25(2) of the Coroners Act 2003 I am empowered to make recommendations that in the opinion of the Court might prevent, or reduce the likelihood of, a recurrence of an event similar to the event that was the subject of the inquest.

24.2. The Court therefore makes the following recommendations directed to the Minister for Health and Wellbeing, the Chief Executive of SA Health and the Chief Executive of CALHN:

1) That the current CALHN ACS Pathway[186] be amended to:

a) include a step immediately after the Initial ECG requiring consideration of other serious causes of chest pain such as aortic dissection;

[184] Exhibit C31, page 15
[185] Exhibit C31, page 11; Transcript, page 351
[186] Exhibit C18

b) include the stipulation that a structured senior review should consider the possibility of other causes of chest pain and specifically refer to aortic dissection.

2) That each Local Health Network in South Australia consider where appropriate developing a regular education program regarding aortic dissection presentations and its diagnosis, having regard to the recommendations in the paper by Professor Anne-Maree Kelly, '*What Can Be Done to Improve Diagnosis of Aortic Dissection*'.[187]

24.3. The Court makes the following recommendation directed to the Royal Australian College of General Practitioners and the Australian and New Zealand Society of Cardiac and Thoracic Surgeons:

3) Acknowledging the need to ensure that patients who are known to be at risk of aortic dissection have this condition clearly communicated to all treating health practitioners, including hospitals who may treat the patient, I recommend that the Colleges communicate to their members the desirability of flagging aortic conditions on a patient's My Health Record.

Key Words: Aortic Dissection; Diagnosis

In witness whereof the said Coroner has hereunto set and subscribed her hand and Seal the 1st day of March, 2023.

Coroner

[187] Exhibit C31a