IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

Court Reference: COR 2007 0595

FINDING INTO DEATH WITH INQUEST

Form 37 Rule 60(1)
Section 67 of the ***Coroners Act 2008***

Inquest into the Death of: HOLLY SOUTH

Hearing Dates:	21 February 2011 to 24 February 2011
Appearances:	Ms Fiona McLeod SC with Ms J Treleaven of Counsel on behalf of the family of Holly South. Mr Neill Murdoch of Counsel on behalf of the Royal Children's Hospital
Police Coronial Support Unit:	Leading Senior Constable Tania Cristiano, Assisting the Coroner
Findings Of:	AUDREY JAMIESON,CORONER
Delivered At:	Coroners Court of Victoria Level 11, 222 Exhibition Street Melbourne 3000
Delivered On:	26 September 2012

I, AUDREY JAMIESON, Coroner having investigated the death of HOLLY SOUTH

AND having held an inquest in relation to this death on 21 February to 24 February 2011 at Melbourne

find that the identity of the deceased was HOLLY BRIDGET MARION SOUTH

born on 15 June 2006

and the death occurred on 13 February 2007

at the Royal Children's Hospital, North Melbourne 3051

from:

1 (a) HYPOXIC-ISCHAEMIC ENCEPHALOPATHY

1 (b) THROMBOSIS IN BLALOCK SHUNT

in the following summary of circumstances:

1. Holly South had a complex congenital heart abnormality that had been diagnosed prenatally. She died at the Royal Children's Hospital after presenting to the Emergency Department via ambulance with a history of vomiting.

BACKGROUND CIRCUMSTANCES

2. Holly South[1] was born at Monash Medical Centre (MMC) on 15 June 2006 to parents Loretta Coughlin and Adam South. Prior to her birth, a foetal scan identified a probable diagnosis of hypoplastic right ventricle, pulmonary atresia with probable right ventricle sinsoids draining into the coronary arteries. The prenatal findings were confirmed following her delivery. Additional findings included a reasonable sized atrial septal defect with right to left shunting,

[1] Holly's parents requested that during the course of the Inquest she be referred to by her first name only. For consistency, I have in most part, also used only her first name in the written Finding.

smaller than normal pulmonary arteries and a patent ductus supplying the distal pulmonary arteries.

3. On 18 July 2006, Holly was transferred from MMC to the Royal Children's Hospital (RCH). On 25 July 2006, she underwent a right modified Blalock-Taussig shunt and atrial septectomy. She had a complicated post-operative period including suffering a cardiac arrest on 31 July 2006, which necessitated the implementation of ECMO[2]. Holly's precarious condition also necessitated two returns to theatre on 2 August 2006, for modification to the shunt. In the following days, she returned to the operating theatre on a number of occasions but was eventually extubated and transferred from the Intensive Care Unit (ICU) to the general ward. Holly remained an inpatient at the RCH until 26 August 2006. She remained a patient of both RCH and MMC but was medically managed from MMC.

4. On her discharge from RCH, Holly's parents were advised that due to Holly's single ventricle physiology that is, shunt dependant, the risks of dehydration were much greater for Holly than for a child of the same age with a normal heart.

5. In the following months, Holly's treating physician, Professor Samuel Menahem, reviewed Holly at regular intervals at MMC. In that period, she required admission to RCH with a viral infection for observations only and was discharged the next day. She was also admitted to Westmead Children's Hospital for a few days after becoming ill with an upper respiratory tract infection during a family trip to Sydney.

6. Professor Menahem last saw Holly on 7 February 2007, at which time *she appeared to be doing well.*[3] She had a longstanding history of loose stools, which had gradually improved after being placed on a special formula. The plan was to review Holly monthly until such time she was sufficiently stable to proceed to have the second stage of her procedure performed, that is, connecting the superior vena cava to the pulmonary artery.

7. Holly was booked to have the second stage of her procedure performed on 5 March 2007. The operation consists in the division of the Blalock-Taussig *shunt and the connection of the superior vena cavae to the right pulmonary artery so that the blood of the upper part of the*

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[2] ECMO = Extra Corporeal Membrane Oxygenation. Also referred to as heart-lung machine (Exhibit 14 – Statement of Dr Frank Shan dated 31 December 2007)

[3] Exhibit 1 – Statement of Professor Samuel Menahem dated 11 May 2010

body is drained directly into the lungs.[4] On 8 February 2007, Associate Professor Yves d'Udekem saw Holly's parents in his rooms at the RCH. He explained to them the nature of the procedure and the risks associated with the surgery.

SURROUNDING CIRCUMSTANCES

8. Holly lived with her parents, Adam South and Loretta Coughlin and her elder sister, Lauren, at 30A Miller Street, Highett, Victoria.

9. On or about 9 February 2007, members of Holly's family became sick with a viral illness.

10. On 11 February 2007, at approximately 2.30pm, Holly had a feed. At approximately 5.00pm, Holly vomited. At approximately 7.00pm, Holly's parents were becoming worried about Holly's hydration status. At 7.47pm, Mr South telephoned for an ambulance advising '000':

> *I've got a baby with a cardiac condition and she's got a viral infection the rest of the family have had it and there is a risk of dehydration.*[5]

11. In response to specific questions, Mr South also informed the call taker that Holly had been *vomiting*, had *a temperature*, was *conscious* and *breathing fairly normally* and that she has *a shunt in her heart.*

12. At 7.53pm Ms Coughlin received a call from an Ambulance Service's clinician seeking further information about Holly's condition.

13. At 8.06pm, an ambulance was despatched on a Code 2.[6] At 8.13pm, Mr South telephoned the ambulance service again as he was getting more worried about Holly's condition. At 8.15pm, Ambulance paramedics from the Mordialloc branch, David Reinhard and Anita Feder, arrived at the Highett home.

14. At approximately 8.25pm, the ambulance departed from the Highett home to convey Holly to the RCH on Transport Code 2 – Acute Non Time Critical. Holly's parents had requested that

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[4] Exhibit 2 – Statement of Associate Professor Yves d'Udekem dated 24 January 2008

[5] Exhibit 7 (@p 90 Inquest Brief)

[6] Code 2 = "urgent (within 25 minutes) - without emergency devices activated". Also referred to as "Acute – Non Time Critical".

she be transported to RCH rather than the MMC, which was closer, on previous advice given to them at RCH.

15. Holly vomited bile-like fluid *en route.*[7] The ambulance arrived at the RCH Emergency Department (ED) at approximately 9.03pm. At approximately 9.12 - 9.15pm, Holly was triaged by Registered Nurse (RN – Division 1) Clutterbuck as a Category 3[8] and placed in Cubicle 9 within the ED. Holly's father remained with her. He was given a cup of water for Holly on request. Mr South suggested that the staff obtain Holly's medical records. He repeated his suggestion on a number of occasions.

16. At 9.45pm, RN Susan Taylor took Holly's physiological observations. At approximately 10.10pm, Paediatric Registrar, Dr Melanie Thompson reviewed Holly by obtaining a history from Mr South and physically examining Holly. Dr Thompson determined that she needed to commence hydrating Holly *even though she was not looking particularly dehydrated and she remained reasonably responsive and well perfused.*[9]

17. Holly was moved to the procedure/treatment room for insertion of an intravenous cannula for the purposes of fluid replacement. Dr Thompson inserted an intravenous cannula after an initial unsuccessful attempt.

18. At approximately 10.50pm, Holly arrested. She was resuscitated and at approximately 11.30pm, she was placed on ECMO and transferred to the Intensive Care Unit (ICU).

19. At 1.30am on 13 February 2007, Holly was noted to have fixed, dilated pupils with tense fontanelle. A CT scan of the brain showed changes consistent with severe hypoxic-ischaemic brain damage. Following discussions with Holly's parents a decision was made to withdraw ECMO. Holly died soon after.

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[7] Paramedic Feder could not recall the exact number of times Holly vomited on the way to RCH – T @ p175

[8] Category 3 states that a patient should be medically assessed within 30 minutes. In Holly's case that was by 9.45pm.

[9] Exhibit 13 – Statement of Dr Melanie Thompson dated 24 September 2010

INVESTIGATION

Medical investigation

20. Dr Katherine White, Forensic Pathologist at the Victorian Institute of Forensic Medicine performed an autopsy on the body of Holly. Dr White reported that macroscopically there was evidence of thrombus within the Blalock shunt and microscopically a small amount of fibrin thrombus was seen within sections through the Blalock shunt. She commented that as the echocardiogram taken on 12 February 2007 showed the shunt to be patent, it was not clear when the thrombus formed or what was the cause of its formation. Biochemically there was minor evidence of dehydration demonstrated by an elevated creatinine on the blood sample taken from Holly on 12 February 2007 at 1.00am, however, the clinical history of vomiting and listlessness may suggest dehydration or sepsis, both of which, Dr White stated could contribute to a coaguable state. The shunt may have been partially occluded but still appear patent on echocardiography but whether the blockage of the shunt is partial or complete there will be inadequate oxygenation of the blood, contributing to cardiopulmonary arrest and in turn can result in hypoxic ischaemic encephalopathy. Dr White attributed the medical cause of Holly's death to hypoxic-ischaemic encephalopathy arising from thrombosis in her Blalock shunt.

Clinical Liaison Service (CLS)[10]

21. The CLS assisted in the initial stages of the investigation by reviewing Holly's medical records in light of receipt of a letter of concern from Mr South and Ms Coughlin.

22. Statements were subsequently requested from medical and paramedical personnel involved in Holly's medical management.

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[10] The role of the CLS was to assist the Coroner's investigation into the nature and extent of deaths, which occurred during the provision of healthcare, and identify potential system factors in healthcare related deaths. CLS personnel were comprised of practising Physicians and Clinical Research Nurses who drew on their medical, nursing and research experiences, skills and knowledge to independently evaluate clinical evidence for the investigation of reportable and reported healthcare deaths and to assist in identifying remediable factors that may assist in prevention and risk management in health services settings. The CLS was replaced with the Health and Medical Investigation Team (HMIT) in 2010. HMIT sits within the Coroners Prevention Unit, which was established in 2008 to strengthen the prevention role of the coroner. The unit assists the coroner in relation to the formulation of prevention recommendations, as well as assisting in monitoring and evaluating the effectiveness of the recommendations.

Hospital Internal Investigation

23. The circumstances surrounding Holly's cardiac arrest in the ED at the RCH were investigated both internally within the ED and by the RCH through the Patient Safety Committee who examined all aspects of Holly's medical management at the RCH. The recommendations from the Patient Safety Committee were:

    - That the Cardiology Department arrange patient alerts for all patients they deem to be "at risk"; and

    - That guidelines be developed for difficult intravenous access.

Ambulance Victoria Investigation

24. In September 2007, Mr Ray Laidlaw, Clinical Support Officer, conducted an internal review of Ambulance Victoria's involvement with Holly.

JURISDICTION

25. At the time of Holly's death, the *Coroners Act* 1985 (the Old Act) applied. From 1 November 2009, the *Coroners Act 2008* (the new Act) has applied to the finalisation of investigations into deaths that occurred prior to the new Act commencement.[11]

26. In the preamble to the new Act, the role of the coronial system in Victoria is stated to involve the independent investigation of deaths for the purpose of finding the causes of those deaths and to contribute to the reduction of the number of preventable deaths and the promotion of public health and safety and the administration of justice. Reference to preventable deaths and public health and safety are referred to in other sections of the Act.[12]

27. Section 67 of the new Act describes the ambit of the Coroners' findings in relation to a death investigation. A Coroner is required to find, if possible, the identity of the deceased, the cause of death and, in some cases, the circumstances in which the death occurred.[13] The 'cause of

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[11] Section 119 and Schedule 1 - *Coroners Act 2008*

[12] See for example, sections 67(3) & 72 (1) & (2)

[13] Section 67(1)

death' generally relates to the *medical cause of death* and the 'circumstances' relates to the *context* in which the death occurred.

28. A Coroner may also comment on any matter connected with the death, including matters relating to public health and safety and the administration of justice.[14] A Coroner may also report to the Attorney-General and may make recommendations to any Minister, public statutory authority or entity, on any matter connected with a death which the Coroner has investigated including recommendations relating to public health and safety or the administration of justice.[15]

Identification

29. The identity of Holly Bridget Marion South was without dispute and required no additional investigation.

INQUEST

30. Direction Hearings were held on 27 April 2010, 23 June 2010 and 5 November 2010.

31. An Inquest was held pursuant to section 52(1) *Coroners Act 2008*. The issues identified as requiring further examination through a public hearing included:

- Ambulance response times and categories;
- Triage at the RCH;
- Delay relating to the care and treatment of Holly generally;
- Whether Holly's death was preventable.

32. *Viva voce* evidence was obtained from the following witnesses:

- Professor Samuel MENAHEM – Consultant Physician
- Associate Professor Yves D'UDEKEM – Consultant Cardiac Surgeon

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[14] Section 67(3)

[15] Section 72(1) & (2)

- David Leigh REINHARD – Ambulance Paramedic
- Anita Ruth FEDER – Ambulance Paramedic (Student Paramedic at the time)
- Anthony John BALM – Manager, Quality Review Team, Ambulance Victoria
- Lynne Kate CLUTTERBUCK (nee ADDLEM)– Registered Nurse Division 1, Triage Nurse
- Susan Anne TAYLOR – Registered Nurse Division 1, Cubicle Nurse
- Dr Melanie Jane THOMPSON – Paediatric Registrar
- Dr Frank Athol SHANN – Consultant Intensivist
- Cyril Thomas DIXON – Registered Nurse Division 1, Nurse Unit Manager, Emergency Department
- Dr Peter Leslie John BARNETT – Deputy Director of Emergency Services

FINDINGS, COMMENTS & RECOMMENDATIONS

Ambulance times

1. The call received from Mr South at 7.47pm was referred by the ESTA[16] call-taker onto the Ambulance Services' referral service or REFCOMM,[17] as a Code 2. At 7.49pm, the REFCOMM Duty manager referred the call to a clinician however, according to Mr Balm, it was not clear[18] whether a clinician had in fact telephoned the Highett home and obtained further details of Holly's condition or if a clinician has reviewed the details obtained by the call-taker. The ERTCOMM Event Register[19] notes that at 7.52pm, the event type was

[16] ESTA = Emergency Services Telecommunications Authority – more commonly known as the '000' Operator. ESTA was established as a statutory authority on 1 July 2005 under the *Emergency Services and Telecommunications Authority Act 2004* (Vic). ESTA is vested with responsibility for the provision of multi-agency emergency services communications including call taking dispatch and related information transfer services to emergency services including Ambulance Victoria (Metro).

[17] REFCOMM is an AV resource that considers whether emergency ambulance dispatch is required to deal with a particular event/request rather than triggering immediate ambulance dispatch.

[18] T @ p188-189, 209 (Mr Balm)

[19] Exhibit 6

changed. However, there is transcript[20] of a call at 7.53pm from "Paul" at REFCOMM telephoning the Highett home, requesting further information in respect of the request for an ambulance. Ms Coughlin spoke to "Paul" and advised him of Holly's *hyperplasic heart and presence of a shunt and her current problem of started vomiting today about 2.30* and that she had *vomited four times in the last half hour*. Ms Coughlin also told the REFCOMM caller that because of Holly's heart condition *getting dehydrated is incredibly risky so we want to get into hospital so they can put her on a drip*. Ms Coughlin also stated that Holly was *struggling and she's laboured* in her breathing.

2. The information conveyed to the REFCOMM caller by Ms Coughlin was different from the information conveyed by Mr South to the ESTA operator. Based on the information conveyed by Mr South to the ESTA operator it was reasonable for the request for an ambulance to be referred to REFCOMM. Whether there had in fact been a significant deterioration in Holly's condition in the six minutes between the calls, I am not able to determine. At 8.06 pm, an ambulance was despatched.

3. Ambulance Paramedic David Reinhard and student Ambulance Paramedic, Anita Feder arrived at the Highett home at 8.15pm that is, within nine minutes of having been despatched. They were with Holly one minute later. Ms Coughlin told the Paramedics about Holly's cardiac history[21] and her contemporaneous concerns that Holly had not been feeding well that afternoon until around 6.00pm when she had taken some food but vomited soon after.[22] On examination, Paramedic Reinhard found Holly to be conscious and alert with heart and respiratory rates that were elevated but still within Ambulance Guidelines[23] for the upper limit of normal for Holly's age. There is no reference to Holly's breathing being laboured or that she was struggling to breathe. Her complexion/colouring was noted to be pale. The outcome of the Paramedic's assessment, which included factoring in the information given about Holly's

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[20] Exhibit 7

[21] T @ 170 (Paramedic Feder)

[22] Exhibit 6 – Statement of David Reinhard dated 26 May 2010

[23] Exhibit 8

cardiac condition,[24] was to transport Holly to hospital. It was not within the Paramedics' scope of practice to insert an intravenous line into a child for hydration purposes.[25]

4. The Paramedics departed the Highett home with Holly at 8.28pm on a Code 2.[26] Mr South followed the ambulance in his own vehicle. Paramedic Feder travelled in the rear of the ambulance with Holly and monitored her condition throughout the trip. Holly was connected to a cardiac monitor and her vital signs,[27] recorded at 8.35pm, 8.50pm and 9.02pm,[28] remained stable. She vomited small amounts on two occasions during the trip, which warranted some suctioning. The ambulance arrived at the RCH ED at 9.03pm. Holly was triaged and assigned a cubicle. The Ambulance Paramedics cleared the hospital at 9.31pm.

5. The evidence supports a finding that Ambulance Paramedics Reinhard and Feder arrived at the Highett home within the anticipated achievable response time for a Code 2[29] from the time they were despatched and were within the anticipated achievable response time for a Code 1.[30] At the Highett home, the Paramedics factored in the information about Holly's cardiac history into their decision to transport her to hospital despite not having a real understanding[31] about the seriousness of the condition. They made that decision within nine minutes of their arrival at Holly's side. The period taken to transport Holly to the RCH was reasonable having regard to the distance, the clinical assessment that Holly was a Code 2 patient and that Holly and Paramedic Feder were unrestrained in the rear of the ambulance. Despite the vomiting, there is no evidence that Holly's condition deteriorated at anytime during the Paramedics' period of engagement with her, which was approximately 60 minutes.

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[24] T @ p 126 & p145 (Paramedic Reinhard)

[25] T @ p128 (Paramedic Reinhard)

[26] According to Paramedic Reinhard: *A Code 2 case we would generally travel under normal road conditions obeying normal road laws without the use of lights and sirens, in effect, prompt transport to hospital.* (T @ p 125)

[27] Holly's blood pressure was not taken because the Paramedics did not carry a blood pressure cuff small enough to accommodate her small size. (T @ p 130 – Reinhard)

[28] Exhibit 4 – Electronic Patient Care Report

[29] A Code 2 does not have a formal KPI response time but *an informal target time of 25 minutes* expected to be met in 90% of cases – T @ p 215 & 225 (Balm)

[30] *The KPI for a Code 1 case is ten minutes.* T @ p129 (Paramedic Reinhard)

[31] T @ p145 (Paramedic Reinhard)

6. Despite not having all the information that had been conveyed to the REFCOMM caller or a working knowledge of Holly's condition, I am satisfied that the Paramedics acted in a timely and professional manner. I am satisfied that they responded appropriately to Holly as they found her on their arrival at the Highett home. I make no adverse finding in relation to the Ambulance Victoria Paramedic's response times, attendance time on Holly at her home, time of transfer or the decision to proceed to the RCH at the family's request.

7. If there is a contribution to Holly's death by the delay in the commencement of intravenous hydration and that delay can be attributed to a delay in, albeit in part, getting Holly to the RCH then the delay rests only between the time of the request for an ambulance and the despatching of the same. The total response time of Ambulance Victoria that is, from time of receipt of the call was 28 minutes to the Highett home and 29 minutes to Holly's side, which in total is three to four minutes outside the 25 minute anticipated achievable response, or informal response time, for a Code 2.[32]

8. In the absence of a memorandum of understanding between the RCH and Ambulance Victoria about the level of urgency for transportation for children with complex cardiac conditions, I make no adverse finding in relation to Ambulance Victoria response times in this case. (See **Recommendations** No: 1-3).

9. I further find that the decision to transport Holly to RCH was the right decision. That decision was based on the request of Holly's parents who had themselves been advised that Holly should return to the RCH if she became unwell rather than going to MMC where Holly's paediatrician was located. Dr Shann stated that if it had been his child with a complex cardiac condition he would have taken the child to the RCH. He said of Holly:

> *..her chances of having the expertise available to deal with her are greater at the Royal Children's than at Monash so she certainly wouldn't have got ECMO if she'd been at Monash.*[33]

10. However, Dr Shann went on to say that what we do not know is whether Holly would have needed ECMO had she gone to MMC, been seen earlier and had fluid replacement commenced earlier. He also stated that Holly could have had a cardiac arrest even if treatment/hydration had been commenced earlier.

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[32] T @ p 226 (Mr Balm)

[33] T @ p 333 (Dr Shann)

Triage at the Royal Children's Hospital Emergency Department

11. On arrival at the RCH ED Paramedic Reinhard recalled that *triage was probably accomplished fairly promptly*.[34] The Paramedics gave a handover to the Triage nurse,[35] RN Clutterbuck.[36]

12. RN Clutterbuck recorded Holly's presenting problem as:

    VOMITING – NON SPECIFIC, PT WITH Hx HYPOPLASTIC LEFT HEART, AND SHUNT, VOMITING TODAY, LISTLESS, REFUSING FLUIDS, O2SAT 75-85%

13. RN Clutterbuck's recorded assessment was:

    SLEEPING BABE, CYANOSED NAIL BEDS, SOFT FONTANELLE, WARM, MILDLY MOTTLED, MMM[37]

14. RN Clutterbuck allocated a Triage Category 3 to Holly and placed her in Cubicle 9 within the ED. RN Clutterbuck said that she had no independent recollection of having triaged Holly and considered Holly's triage as routine. Further, she was satisfied that she had triaged Holly correctly into category 3 – to be seen within 30 minutes. RN Clutterbuck finished her shift at 9.30pm. She was unaware that Holly had arrested.

15. I make no adverse finding with respect to the triaging of Holly. RN Clutterbuck discharged her responsibilities as Triage Nurse without delay and did so based on the information provided to her by the Paramedics and on her own clinical assessment. RN Clutterbuck could have assessed Holly as a Triage Category 2 based on her cardiac history however, attributing Triage Category 3 was not inappropriate in the circumstances.

Management within the Emergency Department

16. RN Taylor was working in the ED that evening as a Cubicle Nurse. She was allocated four cubicles including Cubicle 9 where Holly had been placed at 9.15pm. RN Taylor believes that the information she recorded as the presenting problem was obtained from the Triage Nurse, RN Clutterbuck. RN Taylor was aware of Holly's history and aware that Mr South was concerned about hydration however, from her own assessment of Holly, RN Taylor did not

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[34] T @ p 130, 156 (Paramedic Reinhard)

[35] T @ p 156 (Paramedic Reinhard)

[36] Nurse Clutterbuck's surname at the time was "ADDLEM"

[37] MMM = moist mucus membranes

consider her to be *overly dehydrated*[38] and was not *concerned about her condition.*[39] RN Taylor believes that she did do a reassessment of Holly at that time she was placed in Cubicle 9, as that would be her normal practice however, she did not make any recording of Holly's observations until 9.45pm. RN Taylor recalled that she had connected Holly to the cardiac monitor from which she obtained her heart rate and oxygen saturations but she did not keep Holly on continuous monitoring.[40] She watched for and calculated Holly's respiratory rate. She did not attach Holly to the blood pressure machine/sphygmomanometer because *it can be stressful for children, for young children.*[41] RN Taylor said that she had *observed Holly (sic) several times in the period that she was there*[42] which involved both observing/sighting her and taking her vital signs. She did not however, make any record of these observations. RN Taylor believed that her lack of recorded observations were because:

> *it was a particularly busy night and also when Holly first arrived in the cubicle and her dad left to move his car I was possibly unable to write the first set of observations down because I was alone with Holly and I was trying to cajole her, (sic) she was quite upset.*[43]

17. RN Taylor did not follow-up with any of the doctors on duty for a medical assessment of Holly. Triaged patients are assessed by the medical staff according to the allocated triage priority, which is obtained from the hospital's computer system. The cubicle nurses do not play a role in assisting medical staff complying with the triage time frames.[44] The cubicle nurses would only interact or follow-up the medical staff to see a particular patient if the patient deteriorated/needed to be seen sooner.[45] According to the Nurse Unit Manager at the time, RN Cyril Dixon, any nursing responsibility lies with the nurse-in-charge of the shift to work with the senior medical staff to *understand all that is happening in the department.*[46]

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[38] T @ p 279, 280 & 281 (RN Taylor)

[39] T @ p 279 (RN Taylor)

[40] T @ p 298 (RN Taylor)

[41] T @ 270 (RN Taylor)

[42] T @ p 271 (RN Taylor)

[43] T @ p283 (RN Taylor)

[44] T @ p372 (RN Dixon)

[45] T @ p 275,285, 293-294 (RN Taylor)

[46] T @ p 372 (RN Dixon)

18. I have no reason to doubt that RN Taylor was making visual observations of Holly and that this practice constitutes important and valid clinical assessment however, RN Taylor's failure to adequately document Holly's vital and clinical signs impacts negatively on her professional standing because it exposed a shortcoming in her nursing practice on this night. The lack of documentation diminished the value of the hospital's records as an accurate historical depiction of events and left the hospital and thus RN Taylor open to scrutiny and adverse comment. The lack of documentation raised doubt about the delivery of care to Holly whereas documentation of vital and clinical signs should act as the health care provider's means of communication, an *aide memoir* to the creator and leave no doubt to the observer/inquirer of its accuracy.

19. It was apparent that RN Taylor found the work in ED and the scrutiny of her involvement with Holly very stressful and has since ceased work in the ED.[47]

20. Dr Thompson, Paediatric Registrar,[48] commenced work in ED at 10.00pm. Dr Jo Grindlay, the ED Consultant in-charge, asked Dr Thompson to see Holly first as she had been waiting long beyond her time.[49] At approximately 10.10pm, that is, approximately 55-58 minutes after Holly was triaged as a Category 3 – to be seen in 30 minutes; Dr Thompson went to Cubicle 9 to assess Holly. According to Dr Thompson's notes, Mr South informed her that Holly had been vomiting since approximately 2.30pm and refusing oral intake. Her last wet nappy was at approximately 3.00pm and she had ongoing vomiting.[50] Dr Thompson cut short taking a full history from Mr South because she was aware that Holly was at higher risk of dehydration because of her underlying cardiac condition. Dr Thompson wanted to commence hydrating Holly as soon as possible. For these purposes, Holly was transferred to the procedure/treatment room - carried there by her father. RN Taylor was also in attendance and assisting Dr Thompson. The first attempt at inserting an intravenous cannula into Holly was unsuccessful but successful on the second attempt. Shortly thereafter, while the cannula was being taped/secured into position,[51] Mr South alerted Dr Thompson and RN Taylor to Holly's colour. She had become more blue or cyanosed although she remained *alert and responsive*

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[47] T @ p 299 (RN Taylor)

[48] Dr Dr Thompson was in her third year of her paediatric training – T @ p 301 (Dr Thompson)

[49] Exhibit 13 & T @ p 301 (Dr Thompson)

[50] P 66 Inquest Brief, Exhibit 13 & T @ p 315 (Dr Thompson)

[51] T @ p 319 (Dr Thompson)

and crying.[52] Dr Thompson instructed RN Taylor to apply an oxygen mask to Holly. Dr Thompson left the procedure room with a blood sample she had retrieved via the newly inserted cannula to arrange for it to be collected for analysis and to advise Dr Grindlay that Holly's condition had deteriorated[53] and that she was planning to move her to the Resuscitation Bay.[54] While she was away from Holly, Dr Thompson heard a call over the loudspeaker for the Resuscitation Team to go to the Resuscitation Bay. Dr Thompson was a member of the Resuscitation Team and she assisted in the resuscitation of Holly.

21. I am satisfied that Dr Thompson was the first doctor to attend on Holly and contrary to Mr South's recollection, I am also satisfied that Dr Thompson was the first member of the ED staff to attempt to insert an intravenous line into Holly. Dr Thompson's actions accorded with Hospital Clinical Practice Guidelines on gaining difficult vascular access, as they existed at the time[55] and contemporaneously. In the absence of a specific policy surrounding the insertion of intravenous lines into children with complex cardiac conditions, I am satisfied that Dr Thompson had the appropriate qualifications and experience to perform the procedure on Holly that evening in the ED. According to Dr Shann, Intensivist, it was *admirable practice* that Dr Thompson was able to insert an intravenous line into Holly on only the second attempt. He said it could be *strikingly difficult* to cannulate children that have had multiple procedures performed. [56]

22. In relation to the time taken for a doctor to see Holly, Dr Thompson conceded that ideally, Holly *would have been seen earlier in the night* but that she had remained clinically stable and there was no indication that Holly was going to arrest. Dr Thompson did not believe that the triage categorisation of Holly was inappropriate but agreed that *ideally all patients should be seen within their triage category time.*[57]

Alert systems at the Royal Children's Hospital

23. Mr South repeatedly suggested that ED staff retrieve Holly's medical records. He was right to inform them of the existence of her records because the information in them may have been

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[52] T @ pp 313-314 (Dr Thompson)

[53] T @ 312 (Dr Thompson)

[54] Exhibit 13

[55] T @ p 387 (Dr Barnett)

[56] T @ pp 340-341 (Dr Shann)

[57] T @ pp 314-315 (Dr Thompson)

helpful in providing guidance to her ED management. ED staff did not see Holly's medical records before she arrested. I am however satisfied that a request would have automatically been made for the retrieval of existing records from the hospital medical records storage area once Holly's admission details had been entered onto the hospital computer system by the clerical staff and a UR number allocated. I also accept that this would have occurred automatically without a doctor or a nurse requesting them.[58] Whether Holly's records were in the medical records storage area or some other part of the hospital such as Dr d'Udekem's rooms was never established.[59] Given that Holly's records were not readily available it seems unlikely, even if they had been retrieved, that the paediatric registrar would have had time to review them prior to Holly's arrest. If the records had been available and had been reviewed by the paediatric registrar this may have delayed her attendance on Holly and in the absence of any clear instructions of how to manage Holly's presentation, the availability of Holly's records to the ED staff is unlikely to have made any difference to the outcome.

24. Hospital Clinical Practice Guidelines on gaining difficult vascular access have been amended or formalised[60] to include a plan for assistance with vascular access either by an anaesthetist or from the intensive care unit. The Guidelines for difficult intravenous access were developed with input from the ED and are directed to medical staff rather than nursing staff.[61] Changes to the Guidelines that were specific to Holly's circumstances were not however capable of identification.[62] Similarly, the guidelines are not specific to the ED but designed for the whole hospital.

25. The Accelerated Care (through the) Emergency (department) (ACE) is a system that was in place at the time of Holly's presentation to the ED. The purpose of the system is to alert medical practitioners to the appropriate approach to managing complex patients who attend the ED on many occasions.[63] It was not specifically designed to deal with the management of patients such as Holly.[64]

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[58] T @ p 385 (Dr Barnett)

[59] T @ p 401 (Dr Barnett)

[60] T @ p 366 (RN Dixon) & T @ p412 (Dr Barnett)

[61] T @ p 368 (RN Dixon)

[62] T @ pp 386-388 & 413 (Dr Barnett)

[63] T @ p 370 (RN Dixon)

[64] T @ p 371 (RN Dixon)

26. Another existing system known as the Emergency Department patient Information System (EDIS), involves individual departments within the RCH communicating electronically by an appropriate form to the ED, a patient specific alert that will be seen at triage and will be printed on the treatment sheet thereafter.[65]

27. There were no alerts entered in the hospital computer system in respect of Holly. According to Dr Shann neither the ACE or the EDIS alert system have not worked as well as anticipated.

28. Of significance to Holly's circumstances, is a system aimed at effective communication of complex cardiac conditions, which has involved the development of a card for families to present at Emergency Departments wherever the family may be - to ensure that informed management can be provided. Dr Shann was instrumental in the development of this card system,[66] which was still in its developmental stages at the time of the Inquest however, I subsequently received confirmation from Minter Ellison Lawyers,[67] that the development of the card had been finalised. A photocopy of the card was provided to me and one side is titled: *This patient has complex heart disease and requires urgent specialist assessment* - and on the other side - *Guidelines for hospital staff.* The news of the prospect of "the card" was well received by Holly's family. I have attached the copy of "the card" to the Finding (see **Attachment A**).

29. On examination of the information contained in this card, I have formed the view that it provides more than guidance. *Prima facie*, the guidelines are quite prescriptive about how hospital staff are to treat children with complex heart disease on presentation to any hospital, whether it be their regular hospital or another such as may be needed while travelling. Specifically, "the card" informs staff that the carrier of the card is *at high risk of death if he or she develops dehydration or cyanosis* and that *the child should be seen urgently by the most senior doctor available.* Contact details of the RCH Cardiology Fellow and the PETS[68] are provided with a definitive instruction to contact either of them for advice. There is no reference to Triaging.

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[65] Exhibit 16 – Statement of Cyril Dixon dated 29 January 2008 & T @ pp 371-371 9Dixon)

[66] T @ p 337 (Dr Shann)

[67] Letter from Minter Ellison dated 3 June 2011

[68] PETS = Paediatric Emergency Transport Service

30. Furthermore, the relationship between a risk of arresting and the insertion of an IV line is given specific attention and provides detailed measures to adopt despite being couched in the language of a guideline:

> *The child may arrest if upset by the insertion of an IV line. Consider*[69] *sedation 15-20 minutes before with buccal midazolam 0.3 mg/kg (mix the IV preparation with an equal volume of 33% sucrose to mask taste, then use a syringe to put it in the side of the mouth).*

31. In addition, there are directions on hydration: *rehydrate the child with 10 ml/kg boluses of 0.9% saline* and a direction on the administration of heparin 50 units/kg IV to be given *if the child develops severe cyanosis or cardiac arrest.*

32. I commend the RCH for the development of a comprehensive management plan in a form that is easy for parents of children with complex heart conditions to carry at all times. This card provides certainty to parents about the scope of the management of the child on presentation at hospital and provides direction to medical staff about medical management.

Acknowledgement

33. The Royal Children's Hospital acknowledged that according to Holly's Triage Category, a doctor should have seen her by 9.45pm. The hospital also acknowledged that any observations of vital signs or other clinical signs made in the period that Holly was in Cubicle 9 within the ED should have been documented and that it was inadequate nursing practice not to make such a record. RN Dixon stated:

> *... the expectation would have been to have performed a normal head to tail assessment and documented that on the nursing documentation in the cubicle.*[70]

CONCLUDING COMMENTS/FINDINGS

34. The RCH card for children with complex cardiac conditions has been designed and developed for the purposes of preventing like deaths to that of Holly's. Had Mr South had such a card, the management of Holly would have been different from the outset. Had the card been presented, Holly would not have been triaged but seen immediately by the most senior doctor

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[69] My emphasis.

[70] T @ p 379 (RN Dixon)

and the Cardiology Fellow would have been contacted, invoking the immediate specialist involvement in Holly's management. Furthermore, had the card been presented to ED staff, the management of Holly's hydration may have also taken a different and less stressful course if the prompt on the card to consider sedation had been invoked.

35. The clinical management and clinical course for Holly may have been markedly different had the card been in operation at the time of her presentation to the RCH ED on 11 February 2007. In the absence of the card's *Guidelines for hospital staff* or its equivalent in hospital policy and procedure, Holly missed an opportunity to have her management streamlined to her condition. Delay in being seen by a doctor was a factor in Holly's case. She was not seen within the Triage Category 3 maximum desirable time of 30 minutes but almost double that time. Also present was her agitation when attempts were being made to insert the IV line. She arrested soon after and as Dr Barnett stated, the precipitant to her arrest was *probably a combination of all the factors rather than one particular thing* and these included *some dehydration* and *distress during insertion of the IV*.[71]

36. The card highlights that the delay in her being seen, in combination with some dehydration and the upset/agitation have more probable than not, contributed to Holly's arrest.

37. However, I am not able to definitively find that the outcome would have been different for Holly. The evidence does not support such a finding. As Dr Shann stated, the existence of the card:

> *...doesn't guarantee similar situations won't occur in the future but it greatly reduces the chance because it informs ...*[72]

38. On a background of the existence of Holly's uncommon, high risk cardiac condition and the exact cause of the thrombosis formation being unknown, a definitive finding that Holly's death could have been prevented by the mere existence, presentation and application of the information in the card, remains speculative.

39. The investigation into Holly's death has highlighted how a breakdown of communication through many levels in her short interaction with the health system, let her down. There was poor communication between the RCH and MMC – the two major hospitals involved in treating and managing her complex and precarious cardiac condition. There was a breakdown

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[71] T @ p 426 (Dr Barnett)

[72] T @ p 329 (Dr Shann)

of communication between RCH cardiology/cardiac surgical units and the ED in failing to flag Holly on ACE or EDIS as needing a special response to a presentation in the ED. There was a breakdown in communication by RCH to its' ED staff about the response required to children such as Holly presenting in the ED that is, the response the cardiology/cardiac surgery unit expects and is now depicted on "the card". In addition, there was a breakdown in communication between RCH and Ambulance Victoria about a best practice response to children with complex cardiac conditions when their parents have concerns about dehydration. The totality of the breakdown in communication culminated in the delay in Holly being seen within the ED and it is this culmination rather than any departure from appropriate standards and delivery of care by individuals, that let Holly and her family down.

40. The development of "the card" addresses many of these issues and with its implementation hopefully will provide reassurance to the parents of other children with these complex cardiac conditions, that the delivery of care now has a coordinated approach. I hope that the scepticism of Dr Barnett is not realised and that the enthusiasm of Dr Shann prevails, as *prima facie*, "the card" appears to rectify all of the RCH communication breakdown issues.

FINDING AS TO CAUSE OF DEATH

41. I accept and adopt the medical cause of death as identified by Dr Katherine White and find that Holly Bridget Marion South died from hypoxic-ischaemic encephalopathy arising from thrombosis in her Blalock Shunt.

42. AND I further find that the delay in Holly being seen by medical staff was less than acceptable and contributed to a delay in the instigation of her medical management. This delay in turn denied Holly of an opportunity to possibly avoid cardiac arrest however, I cannot definitively make a finding that this delay caused Holly's cardiac arrest or that her death could have been prevented.

RECOMMENDATIONS

Pursuant to section 72(2) of the **Coroners Act 2008**, I make the following recommendation(s) connected with the death:

1. I recommend that the RCH's Department of Cardiology/Cardiac Surgery Unit and Ambulance Victoria meet to discuss the management of children with complex cardiac conditions by Ambulance Paramedics in circumstances where they are or may be at risk of developing dehydration or cyanosis.

2. In the event that it is agreed between the RCH and Ambulance Victoria that there is a proactive role to be played by Ambulance Paramedics, I recommend that a memorandum of understanding between the two organisations be implemented.

3. AND in the event that such a memorandum is considered reasonable, practical and appropriate between the organisations, I recommend that consideration be given to amending "the card" to include "Guidelines for Ambulance Paramedics". The inclusion of guidelines for the paramedics on the card would contribute to a holistic approach to the emergency management of these children with complex cardiac conditions. The inclusion of guidelines for paramedics on the card would also assist in improving parent confidence by demonstrative evidence that two significant organisations involved in the emergency treatment of children with complex cardiac conditions have a collaborative approach to the management of their children.

4. AND I recommend that an alert be placed on the RCH's EDIS by the Department of Cardiology/Cardiac Surgery Unit for all children with complex cardiac conditions whose parents have been issued with "the card". This will act as a back-up alert to "the card" and assist those families that present with a sick child without the card in their possession.

5. AND to ensure the success and longevity of "the card" as a medical management tool, I recommend that RCH provide appropriate training to all ED staff on the expected activation and implementation of the guidelines contained in "the card".

Pursuant to section 73(1) of the *Coroners Act 2008,* this Finding will be published on the internet.

I direct that a copy of this finding be provided to the following:

Adam South

Loretta Coughlin

Mr Michael Glen, Rennick Briggs Lawyers

Ms Lisa Ridd, Minter Ellison Lawyers

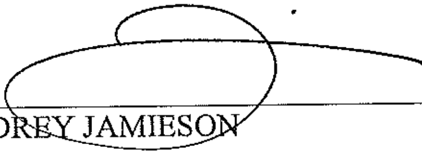
Ambulance Victoria

Mr David Davis MP, Minister for Health and Minister for Ageing

Dr Pradeep Philip, Secretary for Department, Department of Health

Australian Health Practitioner Regulation Agency (AHPRA) Victoria

Signature:

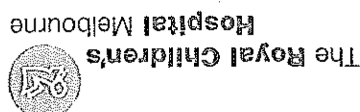


AUDREY JAMIESON
CORONER
Date: 26 September 2012

Guidelines for hospital staff

Systemic artery to pulmonary artery shunt (Blalock or Central) with dehydration or cyanosis

1. This child is at high risk of death if he or she develops dehydration or cyanosis.
2. The child should be seen urgently by the most senior doctor available.
3. Contact the RCH Cardiology Fellow **03 9345 5522** or PETS service **03 9345 5211** for advice.
4. The child may arrest if upset by the insertion of an IV line. Consider sedation 15 – 20 minutes before with buccal midazolam 0.3 mg/kg (mix the IV preparation with an equal volume of 33% sucrose to mask the taste, then use a syringe to put it in the side of the mouth).
5. Rehydrate with 10 ml/kg boluses of 0.9% saline.
6. If the child develops severe cyanosis or a cardiac arrest, give heparin 50 units/kg IV as well as the usual resuscitation drugs.



This publication was funded by Heart Kids,
a support group for heart kids and their families.
Visit www.heartkidsvic.org.au

This patient has complex heart disease and requires urgent specialist assessment.

Please contact The Royal Children's Hospital (RCH) Cardiology Fellow **03 9345 5522** or the Paediatric Emergency Transport Service **03 9345 5211**.

Parents: Keep this card with your child at all times, especially if you travel. Show it to any doctor or nurse you see. Ring The RCH Cardiology Fellow if your child is dehydrated or turns blue.