



## FINDING OF INQUEST

*An Inquest taken on behalf of our Sovereign Lady the Queen at Mount Gambier and Adelaide in the State of South Australia, on the 24<sup>th</sup> and 25<sup>th</sup> days of August 2009, the 12<sup>th</sup> and 13<sup>th</sup> days of March 2010 and the 27<sup>th</sup> day of September 2010, by the Coroner's Court of the said State, constituted of Mark Frederick Johns, State Coroner, into the death of Madison Hayley Ormerod.*

*The said Court finds that Madison Hayley Ormerod aged 4 years, late of 146 Wehl Street North, Mount Gambier, South Australia died at Mount Gambier Hospital, Wehl Street, Mount Gambier, South Australia on the 22<sup>nd</sup> day of September 2006 as a result of consequences of incarcerated congenital left diaphragmatic hernia. The said Court finds that the circumstances of her death were as follows:*

### 1. Introduction

- 1.1. Madison Hayley Ormerod, who was aged 4 years, died on 22 September 2006 in the Mount Gambier Hospital. A post-mortem examination was carried out by Dr Alan Cala and he gave the cause of death as consequences of incarcerated congenital left diaphragmatic hernia<sup>1</sup> and I so find.
- 1.2. Dr Cala noted that a large portion of Madison's stomach, the greater omentum and a segment of transverse colon, posterior to the stomach, had herniated through a hole in the left of the diaphragm into the left chest cavity. He found that the left lung appeared to be underdeveloped (hypoplastic) and this was consistent with a diaphragmatic hernia that was longstanding. The right lung was of normal size. The

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<sup>1</sup> Exhibit C2a

heart was pushed to the right as a result of the herniated and dilated stomach and colon.

1.3. Dr Cala remarked as follows:

'Diaphragmatic herniae are an uncommon cause of death in infancy and childhood. To make an initial diagnosis at autopsy of such a large hernia at this age is unusual. The child's recurrent vomiting may have been caused by the hernia, by possibly allowing free movement of abdominal contents into and out of the left pleural cavity. At times of vomiting, the stomach may have been partially entrapped within the chest, with relief of symptoms when the stomach presumably repositioned itself in the upper abdominal cavity. A chest X-ray taken during an episode of vomiting and pain might have demonstrated the hernia. The hypoplastic left lung suggests the hernia was of long standing and may not have been completely reducible into the abdomen.'<sup>2</sup>

1.4. At this Inquest I heard evidence from Dr Johnson, Madison's general practitioner, Dr Hill, her paediatrician, Dr Zwinjnburg, a doctor who treated Madison in the Mount Gambier Hospital late in the night preceding, and the early morning of her death, Dr Wilson who was the on-call general practitioner paediatrician at Mount Gambier Hospital on the night of Madison's death. Finally, I heard from Dr Starr, paediatrician and infections diseases physician at the Royal Children's Hospital in Melbourne who provided an expert report for the assistance of the Court.

1.5. In considering the circumstances surrounding Madison's death, it is useful to consider firstly the period of 3 or 4 months leading up to her death in the early hours of the morning of 22 September 2006. Secondly, I will consider the events of the late evening of 21 September 2006 when Madison was taken to the Mount Gambier Hospital Emergency Department and released shortly after midnight, only to be re-presented a couple of hours later in a state of collapse.

**2. Madison's treatment in the months preceding 22 September 2006**

2.1. On 19 June 2006 Madison's mother took her to see the general practitioner, Dr Johnson. Dr Johnson gave evidence that the consultation was spent mainly discussing Madison's height and weight<sup>3</sup>. Towards the end of the conversation Dr Johnson said that Madison's mother mentioned that Madison had been vomiting. However, this was not presented as a chronic problem but one that had been going on for a short time. He said that vomiting over a short period is a non-specific symptom in a child of Madison's age and at the time he did not think it was anything to be particularly

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<sup>2</sup> Exhibit C2a, page 2

concerned about<sup>4</sup>. In any event, Dr Johnson decided to arrange for a blood test to be taken. The results of that test were almost all normal, although the ESR was raised, suggesting a non-specific inflammatory response<sup>5</sup>. Madison was seen again on 4 July 2006 by another general practitioner at the same clinic as Dr Johnson because of ongoing vomiting for a couple of weeks and an abdominal ache daily over the same period. The doctor who saw Madison on that occasion ordered further blood tests. He also examined Madison and found no abnormalities. The blood test results returned and were entirely normal.

- 2.2. Madison was brought back to Dr Johnson on 24 July 2006. The concerns that were raised by Madison's mother with Dr Johnson on that occasion are reflected in a letter of referral written by him to the paediatrician, Dr Hill, the same day. The letter is quite short and was in the following terms:

'Large child, out of step with siblings and persistent vomiting

Could you please review this child who is quite large for her age, well above the 95<sup>th</sup> percentile for weight and above the 95<sup>th</sup> percentile for height. This is out of keeping with the body habitus of her other siblings. For the last month she has also had episodes of vomiting, vomiting once a day, and requires a bowl near her bed at night.

She also complains of tummy pains. Activity levels appear normal, and she had been afebrile.

Consultation notes and investigations so far are attached.

I do think this child has some growth abnormality and would like your assessment and advice.'<sup>6</sup>

Dr Johnson did not see Madison again after 24 July 2006<sup>7</sup>.

- 2.3. Dr Hill was the paediatrician to whom Madison was referred. At the time of giving evidence he was retired. He first saw Madison on 22 August 2006. He said that his primary concern as a result of receiving Dr Johnson's referral was to see if there was any reason for Madison's size that could be explained on an organic basis<sup>8</sup>. He said that he was told at his consultation (presumably by Madison's mother) that she had been vomiting once per day for 3 weeks. He said this was a symptom to which he did not attach a great deal of significance<sup>9</sup>. He said that he was primarily concerned to rule out some obscure cause of her body size which might be suggestive of something

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<sup>3</sup> Madison was tall and overweight for a child of her age

<sup>4</sup> Transcript, page 12

<sup>5</sup> Exhibit C20, page 2

<sup>6</sup> Exhibit C10, page 13

<sup>7</sup> Transcript, page 13

<sup>8</sup> Transcript, page 71

<sup>9</sup> Transcript, page 72

‘going on in the brain’<sup>10</sup>. So far as the vomiting was concerned, he said it did not appear to support any specific diagnosis because he would not have expected anyone who had significant diarrhoea and vomiting to be the size that Madison was<sup>11</sup>. He ordered a skull X-ray and bone age X-ray to investigate her size. He also carried out a thorough physical examination which showed no abnormality. He did not consider ordering an X-ray of the chest or abdomen to investigate the abdomen, saying that generally speaking X-rays do not turn up many causes for histories of vomiting and/or abdominal pain<sup>12</sup>.

- 2.4. Dr Hill pointed out that the presence of a diaphragmatic hernia would not necessarily be apparent on X-ray if the abdominal contents did not happen to have been herniating at the time the X-ray was taken<sup>13</sup>. In short, he did not give any consideration to the possible diagnosis of diaphragmatic hernia<sup>14</sup>.
- 2.5. To summarise Dr Hill’s position in relation to the history of vomiting, he said that he did not make much of the story of vomiting<sup>15</sup>. The history of abdominal pain, which is clearly referred to in the letter of referral by Dr Johnson, was something he ‘largely ignored’<sup>16</sup> and ‘possibly should have made more of’<sup>17</sup>.
- 2.6. Dr Hill saw Madison 8 days later on 30 August 2006 and said that he was told that she had only vomited 3 times in the previous week. As a result he did not think there was anything sinister going on. He provided reassurance to Madison’s mother and said he would see Madison again in 3 months<sup>18</sup>.
- 2.7. Dr Hill wrote to Dr Johnson on 4 September 2006 stating that there was nothing to suggest any significant pathology but that he had requested an X-ray of Madison’s left wrist to check her bone age and a skull X-ray but would be surprised if these revealed any significant pathology. He said his impression was that Madison’s size would be ultimately attributable to simple obesity. He said that he had asked to review Madison after the X-rays had been carried out. He wrote a further letter the same day

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<sup>10</sup> Transcript, page 74

<sup>11</sup> Transcript, page 74

<sup>12</sup> Transcript, page 81

<sup>13</sup> Transcript, page 82

<sup>14</sup> Transcript, page 83

<sup>15</sup> Transcript, page 105

<sup>16</sup> Transcript, page 108

<sup>17</sup> Transcript, page 111

<sup>18</sup> Transcript, page 86

reporting upon the outcome of the X-ray studies. He advised that the X-rays revealed no abnormality and that he would reassess Madison in 3 months<sup>19</sup>.

**3. Madison's presentation to Mount Gambier Hospital - evening of 21 September and early morning of 22 September 2006**

- 3.1. Dr Zwinjnenburg was on duty in the Mount Gambier Hospital Emergency Department on the nightshift of 21/22 September 2006. The Mount Gambier Hospital casenotes<sup>20</sup> record that Madison was brought into the Emergency Department at 10:30pm. The presenting complaint records that she had been unwell for several weeks, had been seen by her general practitioner but all tests were negative. This night she had vomited once and her mother was concerned that she had a temperature, looked flat and was lethargic. The triage nurse noted that she appeared to be very flat, lethargic, was now asleep and that she had an appointment with a paediatrician in 2 months' time. She also recorded that Madison had been generally unwell for 3 months. She accorded Madison a triage category of 4.
- 3.2. Madison was seen by Dr Zwinjnenburg at 2400 hours. Dr Zwinjnenburg estimated that she was with Madison and her mother for approximately 30 minutes. She said that Madison was discharged at 12:45am on 22 September 2006<sup>21</sup>. Dr Zwinjnenburg carried out a reasonably thorough physical examination of Madison. She also took a history that Madison had been having episodes of lethargy, nausea and vomiting every 2 to 3 weeks for some time. These episodes lasted 3 to 5 days. Dr Zwinjnenburg noted that Madison had been seen by a general practitioner and paediatrician and had been investigated with blood tests. She noted that Madison gagged when her tongue was examined. Dr Zwinjnenburg told a police officer that when she examined Madison's upper stomach she winced and woke up and told her that it hurt<sup>22</sup>.
- 3.3. Dr Zwinjnenburg observed that Madison's right tympanic membrane was red which might be indicative of a viral infection. She had moist mucus membranes which was an indication that she was not clinically dehydrated. Small lymph nodes were palpable and generalised in her neck, indicating a possible upper respiratory tract

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<sup>19</sup> Exhibit C10

<sup>20</sup> Exhibit C12

<sup>21</sup> Transcript, page 141

<sup>22</sup> Exhibit C19a

infection. Dr Zwinjnenburg could hear some bronchi on the upper airways on examination of Madison's chest but the lower airways sounded normal.

- 3.4. On completion of the examination Dr Zwinjnenburg did not reach any conclusion as to what medical condition Madison was presenting with<sup>23</sup>. She did not regard Madison's presentation as out of the ordinary for young children and, after a lengthy talk with Madison's mother, Dr Zwinjnenburg discharged Madison advising her mother to keep up fluids, give Panadol as required and bring Madison back if she were to deteriorate or if there were any concern<sup>24</sup>.
- 3.5. At 2:20 that morning Dr Zwinjnenburg was still on duty when Madison was brought back to the hospital in a state of collapse. Dr Zwinjnenburg started resuscitation immediately. The on-call anaesthetist was called straight away and the notes record that the anaesthetist, Dr Chong, arrived at 2:30am.
- 3.6. Dr Zwinjnenburg gave evidence that as at midnight on 21 September 2006 there were no radiologists on duty within the hospital. It would have taken approximately 30 minutes for a radiologist to attend and for a report of any scans to be provided<sup>25</sup>. She also said that a diagnosis of diaphragmatic hernia would not have been made unless the abdominal contents had been protruding through the hernia into the chest cavity at the time of the X-ray<sup>26</sup>.
- 3.7. As I have already commented, Dr Zwinjnenburg did notice that upon examination of Madison's upper stomach she winced and woke up and complained that it hurt. However, Dr Zwinjnenburg explained that she did not think this particularly unusual because it is an observation she has made of other children who have responded in the same way<sup>27</sup>.

#### **4. The expert evidence of Dr Starr**

- 4.1. Dr Starr explained that the diaphragm separates the lung from the abdominal cavity. During its development in utero, a hole or defect may sometimes develop in the diaphragm on either the left or right side of the diaphragm. At any time after that defect is present, contents from the abdominal cavity can herniate or push through the defect into the pleural cavity where the lung sits<sup>28</sup>. Dr Starr said that generally

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<sup>23</sup> Transcript, page 147

<sup>24</sup> Transcript, page 148

<sup>25</sup> Transcript, page 152

<sup>26</sup> Transcript, page 153

<sup>27</sup> Transcript, page 169

<sup>28</sup> Transcript, page 214

speaking a newborn infant with such a condition presents with respiratory distress and upon a chest X-ray the diagnosis of diaphragmatic hernia would usually be made<sup>29</sup>. He said that it is uncommon for the condition to remain undiagnosed beyond infancy and that only 2% to 5% of these cases remain undiscovered beyond that period<sup>30</sup>. He also said that in Madison's case the hypoplasia, or under sizing of the left lung, indicated that the hernia had been present for some time such that it had not permitted the left lung to grow properly<sup>31</sup>. He also said that children, like adults, cope quite well without half a lung and, for this reason, it was not surprising that Madison did not exhibit any symptoms of shortness of breath<sup>32</sup>.

- 4.2. Dr Starr said that for a child to present having experienced an episode or episodes of vomiting was not uncommon or unique. He said in fact it is a common presenting complaint in children to an Emergency Department, and he thought to general practitioner as well<sup>33</sup>. However, he said that it is not so common for a child to have weeks and weeks of vomiting whether intermittently or daily. He said that chronic or persistent vomiting may imply something sinister<sup>34</sup>.
- 4.3. It was pointed out to him that Madison also presented with obesity. He commented that vomiting in combination with obesity might be suggestive of some pathology of the brain<sup>35</sup>. Dr Starr said that if he had been presented with a history of vomiting for some time and he had not found anything on examination, he would have ordered an abdominal X-ray and/or a barium study. He said that a normal abdominal X-ray incorporates the bottom part of the chest and would potentially have shown in Madison that one of the lungs was underdeveloped. This may have led to further investigation and diagnosis of the diaphragmatic hernia<sup>36</sup>.
- 4.4. Dr Starr thought that the underdeveloped left lung would quite possibly have reduced air entry to the left side of the chest. He thought that if this was so, a doctor conducting a chest examination should have been able to hear reduced air entry and this would have been a clinical symptom that might have led to the ordering of a chest X-ray<sup>37</sup>.

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<sup>29</sup> Transcript, page 215

<sup>30</sup> Transcript, page 216

<sup>31</sup> Transcript, page 217

<sup>32</sup> Transcript, page 217

<sup>33</sup> Transcript, page 221

<sup>34</sup> Transcript, page 221

<sup>35</sup> Transcript, page 222

<sup>36</sup> Transcript, page 225

<sup>37</sup> Transcript, page 227

- 4.5. Dr Starr acknowledged that Dr Hill's notes documented a reasonably thorough clinical examination<sup>38</sup>.
- 4.6. Dr Starr said that when Madison was presented to the Mount Gambier Hospital on 21 September 2006 he would have admitted her<sup>39</sup> and that he thought that a paediatrician should have been contacted<sup>40</sup>. He believed that on admission hourly observations would have been appropriate<sup>41</sup>. However he acknowledged that Madison still would have suffered her collapse and arrest, even if she had been admitted at that time<sup>42</sup>. He said that even if Madison had been admitted the outcome would have been the same<sup>43</sup>.
- 4.7. Dr Starr was mild in his criticism of Dr Hill's treatment of Madison. Although he had said that he would have ordered an abdominal X-ray, he said that his decision would have depended upon the 'nuance of the history and when the vomiting was taking place and how often'<sup>44</sup>. There was some confusion in the evidence about precisely what history was given to the different clinicians involved with Madison's treatment. This highlights the importance of Dr Starr's comment about the significance of the history and the nuance placed upon it by the individual clinician. Indeed, Dr Starr returned to this theme later in his evidence<sup>45</sup>.
- 4.8. Dr Starr's evidence is probably best summarised by the following passage:

'I think that it was obviously quite an insidious presentation, and by that I mean there were low level symptoms over a period of time that were not specific, and it may well be that the outcome would not have been prevented. A barium study or an abdominal X-ray may have made the diagnosis and have led to the child being transferred, and having surgery, and so on. But it is not perhaps surprising that it went along as it did because it is an unusual presentation at the age of 4 to have a diaphragmatic hernia, so that did not present in a sort of very obvious way, as it were. But I think that in a child that has two and a half months of vomiting, that it does require some proper explanation and it doesn't seem that there was a proper explanation given. I don't think one can say that it was emotional because of going to kindergarten, or whatever. I think that on looking at the information as I have, that I would have done some investigations and I most likely would have done a plain abdominal X-ray or a barium study to rule out a mechanical cause for the vomiting.'<sup>46</sup>

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<sup>38</sup> Transcript, page 229

<sup>39</sup> Transcript, page 241

<sup>40</sup> Transcript, page 242

<sup>41</sup> Transcript, page 244

<sup>42</sup> Transcript, page 245

<sup>43</sup> Transcript, page 247

<sup>44</sup> Transcript, page 250

<sup>45</sup> Transcript, page 255

<sup>46</sup> Transcript, page 259

In short, Dr Starr's criticisms of the treatment that Madison received were muted. He acknowledged that the presentation was 'insidious' and that much depended on the history that was provided to the individual practitioner. Of course, it is also important to bear in mind that the individual practitioners did not necessarily have a clear idea of the history that had been taken by the others, although there was some sharing of notes. Nevertheless, it is easy to see how the 'nuances', to use the expression used by Dr Starr, might have been overlooked.

## **5. Conclusion**

- 5.1. In conclusion, Madison's death from the consequences of an incarcerated congenital left diaphragmatic hernia was a tragic event. Some opportunity no doubt existed for a diagnosis to be made when she was seen by Dr Hill. However, it is not surprising that Dr Hill may have been lulled into a sense of security by virtue of Madison's large size and the absence of clinical signs of illness. Furthermore, as Dr Starr said, it is unusual for a diaphragmatic hernia to present so late in life.
- 5.2. Dr Starr did say that, ideally, Madison should have been admitted to the Mount Gambier Hospital rather than discharged at midnight. He also said that a paediatrician should have been contacted. However, the sad fact is that by this stage it would almost certainly have been too late to have made any difference.

## **6. Recommendations**

- 6.1. I have no recommendations to make in this matter.

*Key Words: Diaphragmatic Hernia; Misdiagnosis*

*In witness whereof the said Coroner has hereunto set and subscribed his hand and*

*Seal the 27<sup>th</sup> day of September, 2010.*

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*State Coroner*