QUEENSLAND COURTS

OFFICE OF THE STATE CORONER

FINDINGS OF INQUEST

CITATION:	**Inquest into the death of Lilli Sweet**
TITLE OF COURT:	Coroners Court
JURISDICTION:	Maroochydore
FILE NO(s):	2013/3454
DELIVERED ON:	6 May 2016
DELIVERED AT:	Brisbane
HEARING DATE(s):	28 July 2015, 2 – 5 November 2015
FINDINGS OF:	John Lock, Deputy State Coroner
CATCHWORDS:	Coroners: inquest, adequacy of health care, Hereditary Spherocytosis, asplenic child, Spleen Australia register

REPRESENTATION:

Counsel Assisting:	Ms M Jarvis, Office of State Coroner
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Counsel for Dr M Davoren:	Mr P Telford I/B Meridian Lawyers
Counsel for Dr Borzi:	Ms J Rosengren I/B Avant Law
Counsel for Drs Scanlan & Swierkowski:	Mr A Luchich I/B Moray & Agnew Lawyers

Counsel for RNs Watson & Taylor:	Mr G Rebetzke I/B Roberts and Kane Solicitors
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Introduction

1. Lilli Sweet was six years of age when she died on Tuesday 27 August 2013 from complications associated with a severe bacterial infection.

2. At the time of her death, Lilli was known to have a medical condition, known as Hereditary Spherocytosis, which made her more susceptible to severe and life-threatening infections. She had a splenectomy (removal of the spleen) performed some two years previously. She was not receiving antibiotic prophylaxis in the time immediately preceding her death.

3. Lilli had a two day history of vomiting, diarrhoea, and headache and was not taking adequate fluid. On 25 August 2013, Lilli's mother appropriately took her to see a GP. The GP referred her to Nambour Hospital Emergency Department. In a letter of referral the GP clearly stated that Lilli had a splenectomy and that it was unclear as to whether she was fully immunised. He suggested bloods be taken for analysis and a paediatric review. Lilli was taken by her mother to Nambour Hospital immediately.

4. In the Nambour ED she continued to vomit and complained of headache. On arrival she had a mild temperature of 37.6°. It was noted that she had ceased prophylactic antibiotics post splenectomy in 2012. She was admitted to the paediatric ward on IV fluids and given panadol/nurofen. Her headache however persisted. Routine blood tests were not ordered in the ED. These were only ordered once she was admitted to the paediatric ward during the evening. Around midnight the doctor on night shift received advice of test results and that the white cell count was highly elevated at 46.5. No further action was taken in respect to this result. Subsequent expert review opined, that in an asplenic child, such a high white cell count indicates serious sepsis.

5. By the following morning, Lilli rapidly deteriorated with an increasing headache, high fevers and neck stiffness. It was at this time Lilli was commenced on intravenous antibiotics. Soon after, she became unresponsive and required emergency resuscitation. A CT scan demonstrated brain stem herniation. She was intubated, ventilated and transferred to the Royal Children's Hospital (RCH). Blood cultures grew a Streptococcus pneumoniae.

6. On arrival at the RCH Lilli was unresponsive with fixed dilated pupils. She died on 27 August 2013. A cause of death certificate issued with the cause of death being brain stem herniation due to pneumococcus. Her death was not initially reported to the coroner.

7. Subsequently as per protocol, the RCH conducted an internal death review. Concerns were raised about the management of Lilli at Nambour Hospital. The case was reported to the Office of the State Coroner on 24 September 2013. The concerns raised included:

    - probable inadequate vaccination for a child who had undergone a splenectomy;
    - lack of antibiotic prophylaxis in an asplenic child;
    - a delay in commencing IV antibiotics on referral to Nambour Hospital due to an initial presumptive diagnosis of a viral illness.

8. A coronial investigation commenced. The investigation focussed on whether anything more could have been done to prevent Lilli's death, and what might be done now to help prevent deaths from happening in similar circumstances in the future by way of preventative comments pursuant to section 46 of the *Coroners Act 2003*.

9. A review was completed by the Clinical Forensic Medicine Unit. A response was received by Nambour Hospital raising systemic resourcing issues as partly contributory. The hospital completed a Root Cause Analysis. Statements and reports were obtained from the medical practitioners and nursing staff, both private and public, directly involved in Lilli's care as to the extent of the intervention strategies implemented in Lilli's case. A report was commissioned from an independent expert paediatrician and clinical geneticist, Dr Stephen Withers, as to these intervention and risk management strategies. The family raised a number of concerns and requested an inquest be held. A pre-inquest hearing was held on 28 July 2015 and the issues determined and dates set for the inquest.

Issues for inquest

10. Apart from the formal findings required by section 45(2) of the *Coroners Act 2003* the key issues were determined as follows:
    - The adequacy and appropriateness of the long-term management of Lilli following her splenectomy in 2011, and
    - The adequacy and appropriateness of health services provided to Lilli at the Nambour Hospital following her presentation to the emergency department on 25 August 2013.

Background medical history

11. The background to Lilli's medical condition begins at her birth. Lilli was one of twins born on 4 December 2006. Shortly after her birth, Lilli was identified as having *hereditary spherocytosis*, a condition that affects the membrane of red blood cells, causing them to be irregularly shaped and therefore more difficult to pass through the spleen. This damages the red blood cells, causing them to break down and die earlier than they should, which then leads to a shortage of red blood cells in the body (otherwise known as anaemia). A number of members of Lilli's family also had this condition. It was not inherited by her twin brother.

12. During the first few years of her life, Lilli experienced recurring anaemia and required multiple blood transfusions and folic acid supplements. She also developed an enlarged spleen, another symptom of her condition.

13. In June 2011, when Lilli was four and a half years old, she was referred to Dr Borzi, a paediatric surgeon, for consideration of a splenectomy, that is, an operation to remove her spleen.

14. A splenectomy is a common treatment for people with Lilli's condition. By removing her spleen, this would allow Lilli's red blood cells to live longer and hopefully put an end to her recurring anaemia and need for transfusions. Lilli's splenectomy went ahead on 14 October 2011 without any apparent complications, and Lilli was discharged home 24 hours after the procedure.

15. Lilli was reviewed by the surgeon, Dr Peter Borzi 12 days after the procedure, and then referred back to her GP, Dr Sean Scanlan and paediatrician, Dr Mark Davoren for ongoing management of her condition.

16. Without a spleen, Lilli would also be left with a lifelong increased risk of a severe bacterial infection. The spleen's main role is to help the body combat infections from certain bacteria. By removing her spleen, Lilli would lose the ability to fight these bacteria herself, placing her at risk of becoming overwhelmed by a serious and potentially fatal infection. This condition is commonly referred to as *overwhelming post-splenectomy infection*, or OPSI.

17. Although relatively rare, OPSI is a very serious condition that can progress from a mild flu-like illness to severe and rapidly lethal sepsis in a short time period. With delayed or inadequate treatment, OPSI has a high mortality rate.

18. The risk of developing OPSI is highest in the first few years following a splenectomy, particularly in children, but has been known to develop as late as 20 years post-splenectomy and is therefore considered a lifelong risk.

19. This risk can be mitigated somewhat by additional vaccinations, and also by use of antibiotic prophylaxis.

The adequacy and appropriateness of long term management of Lilli following splenectomy

20. The two issues identified in relation to the long term management of Lilli's risk of OPSI related to the period for which she was given prophylactic antibiotics and why Lilli did not receive the additional vaccinations recommended for persons at risk of OPSI.

21. Dr Gary Hall of the Clinical Forensic Medicine Unit initially assisted the coroner with a comprehensive review. Dr Gary Hall noted that in patients undergoing splenectomy it is important the patient is aware of the risk of overwhelming and potentially life-threatening infection, particularly from pneumococcus. Hence the importance of undertaking adequate prophylactic measures to counter this risk including the use of pneumococcal vaccine and the administration of antibiotics for a term post operatively.

22. After the splenectomy Dr Borzi wrote to Dr Scanlan informing him of the need for six months of antibiotics.

23. Dr Hall considered that Lilli was adequately managed with antibiotic prophylaxis post splenectomy. In this case, she had been placed on six months prophylaxis, which commenced after her surgery on 14 October 2011.

24. The issue here is that there are differing views amongst specialists and in the medical literature as to whether antibiotic prophylaxis should be given for six months (as recommended by Dr Borzi); twelve months as suggested in some of the literature; until age 18, as was the case for Lilli's half-sister who is also asplenic; or lifelong as is also suggested in some of the literature. In fact Dr Scanlan appears to have extended the period of antibiotic prophylaxis for a period of 18 months at the request of the Lilli's mother but by the time of her presentation at Nambour Hospital she was not taking antibiotics.

25. Dr Withers commented that it is not clear what is the best pathway post splenectomy and there are many different possibilities and agreed with the opinion of Dr Hall. On that basis there can be no criticism of the antibiotic regime undertaken whether six months, 12 months or longer. In hindsight, it is possible that, as Dr Withers said in evidence, if Lilli had been on antibiotic prophylaxis at the time she had presented to Nambour Hospital the outcome may have been different.

26. In relation to the issue of vaccinations, Dr Hall reviewed the medical records and in particular the vaccination schedule and stated that Lilli was vaccinated in accordance with the standard schedule for children of her age cohort but not beyond this on the basis that she was an 'at risk' patient.

27. Dr Hall agreed with the contention, as noted in the RCH review, that Lilli was not adequately immunised for a child who had undergone splenectomy, however, this needs to be balanced against the 25% chance that adequate immunisation may not have conferred immunity against the serotype, which caused her meningitis.

28. As is now known, the subtype of pneumococcus isolated in a blood culture taken from Lilli was subtype 23B, which Pneumovax 23, the vaccination then available, would not cover. That is quite distinct to the giving of antibiotics and it was clear that subtype 23B pneumococcus can be effectively treated by antibiotics if they are given early.

29. Nevertheless, this issue of the failure to vaccinate was one which was aired during the investigation and inquest and it was important to consider the issue taking into account the broader public interest in highlighting the important role that vaccinations have in prevention of OPSI in asplenic children/adults.

30. Dr Withers commented that his review of the records gave him some concern that it was difficult to determine who the responsible person was with respect to ensuring Lilli's care post-splenectomy. He considered it should have been the responsibility of one of the medical practitioners involved in her care to have been diligent in notifying the family of all of the risks. Dr Withers stated that on the basis of the records it is unknown whether her parents were aware of the very real risk of sepsis; the ability for the use of long term antibiotic prophylaxis in preventing sepsis or the requirement for ongoing immunisation to prevent infection within organisms that could lead to overwhelming infection. He considered that the paediatrician responsible for referring Lilli, namely Dr Davoren, should have taken that responsibility.

31. Dr Hall reviewed the medical records from both her GPs and Dr Borzi and Dr Davoren. Prior to the splenectomy, Dr Borzi had written to Dr Davoren recommending that Lilli's vaccinations were up to date and including haemophilus and meningococcus (there was no mention of pneumococcus – an oversight admitted by Dr Borzi). Nevertheless Dr Hall considered that despite the correspondence being somewhat ambiguous he would have thought that both Dr Borzi and Dr Davoren would have understood that Lilli needed to have adequate immunisation and this would include pneumococcus. Drs Borzi and Davoren confirmed this.

32. Dr Hall was not so sure that a GP would necessarily be aware of or have that knowledge and suggested that any correspondence from specialists would

need to be unambiguous and simply stating that her vaccinations needed to be 'up to date' was insufficient.

33. Dr Borzi does not recall any specific conversation with Mrs Sweet about the need for extra vaccinations but described his usual practice of going through a post-splenectomy checklist that included reference to vaccinations. I am less concerned here with the actions of Dr Borzi as it is the view of Dr Withers that the referring paediatrician should take the lead role here.

34. Dr Davoren believes he had a discussion with Mrs Sweet about the need for additional vaccinations as it was his usual practice and his notes include the reference 'immunisations up to date' indicating this was checked in his consultations. In doing so he said he was referring to not only the standard vaccinations but the extended pneumococcal vaccinations.

35. Mrs Sweet states she was never told about Lilli needing additional vaccinations by either Dr Borzi or Dr Davoren but concedes there was some reference in her discussions with Dr Davoren about needing to check all immunisations were up to date. After the splenectomy Lilli was not seen by Dr Davoren again as Mrs Sweet did not consider it necessary. She also did not follow up a recommendation and referral to Dr Davoren given to her in July 2013 by Dr Scanlan. As Dr Withers stated, it would be difficult to assign responsibility or be critical of Dr Davoren in not following up the vaccination issues post splenectomy. That would not be the case during the consultations pre-splenectomy.

36. The evidence of each of the medical witnesses and of Mrs Sweet understandably is compromised by the fallibility of memory of events that occurred four years previously in mid-2011. Those events occurred in the context of relatively uncontentious albeit important decisions to be made by Mrs Sweet, but well before the tragic events of August 2013, about which memory would be heightened.

37. Doing the best I can with the evidence, I accept there were efforts made by the specialists Dr Borzi and Dr Davoren to address the need for Lilli to have additional vaccinations, but these efforts were subjectively inadequate because Mrs Sweet must not have understood the importance of the need for additional immunisations over and above the usual immunisations. Mrs Sweet had ensured Lilli's usual vaccinations were up to date. She ensured Lilli saw her GP and appropriate specialists when required. She took advice concerning much more invasive blood transfusions than a simple vaccination jab and she consented to a splenectomy, a relatively simple yet not totally risk free procedure. Mrs Sweet also understood that Lilli would be more prone to infection. Given all that information, I am absolutely convinced that if Mrs Sweet was aware of the need for a broader vaccination cover she would have made sure this happened.

38. It is noted that the specialists and Dr Scanlan have changed their practices since Lilli's death. Dr Davoren now has access to the immunisation register and would check this where there was any doubt about whether a child had received any additional vaccinations. He also agreed that in future he would make more specific notes about the vaccination status of children who required additional vaccinations, rather than simply recording 'immunisations were up-to-date'.

39. Dr Borzi has also changed his referral letter practice and is also preparing an information sheet to give to parents and children undergoing a splenectomy.

40. Dr Scanlan stated he would ask more questions about vaccinations when seeing children who had undergone a splenectomy.

41. As well Queensland has now joined with Spleen Australia in contributing to the establishment of a register of asplenic patients to raise awareness amongst patients, families and medical practitioners about how to reduce the risk of infections plus recommended vaccines. So far only Victoria, Tasmania and Queensland have agreed to contribute to the register. Victorian and Tasmanian doctors can register their patient's online whilst Queensland patients need to register themselves or provide their medical practitioner with consent to do so.

42. These are all good improvements but simple measures such as ensuring patients, and parents of patients where they are minors, are provided with written advice about what is needed, for instance in this case, vaccinations, would have most likely resulted in the vaccinations being up to date. In this case letters passed between doctors but the information does not appear to have been passed to the patient or her family and this could so simply have been done.

The adequacy and appropriateness of health services provided to Lilli at the Nambour Hospital following her presentation to the emergency department on 25 August 2013

43. The issue that was of most significant concern as identified by Dr Hall and later Dr Withers, was the delay in ordering blood tests and in administering antibiotics to Lilli, particularly after the white cell count was recorded at 46.5.

44. Dr Hall stated it is clear in asplenic patients, in the face of a fever, the administration of a broad spectrum antibiotic such as vancomycin and a second agent such as ceftriaxone should be commenced without delay. Blood cultures should be taken at the time. In the presence of splenectomy a fever must be interpreted as a sign of possible pneumococcal sepsis until proven otherwise.

45. Dr Hall considered there were a number of concerns regarding Lilli's management at Nambour Hospital, not least of which, was a delay in administering antibiotics. Dr Hall considered that there was a reasonable window of opportunity on admission given her GP had highlighted in his referral letter that she was asplenic; had not been completely vaccinated that he was aware and was presenting with symptoms that could suggest meningitis.

46. Dr Hall noted Lilli had been in the ED for four hours after it was clear she was not going to respond to oral fluids. There was a presumptive diagnosis of viral gastroenteritis. She was not reviewed by the paediatric registrar. She was placed on clear fluids and there appeared to be no urgency in commencing IV fluids or to do blood tests. Dr Hall considered she needed to be reviewed in the ED by the paediatric registrar within a reasonable timeframe. He considered the significance of her asplenia in the presence of infection did not appear to have been appreciated.

47. Dr Hall noted that after admission to the ward the history of asplenia was noted and the symptoms of meningitis were reconsidered, however a link between the two did not appear to have been given any significance and there was no

evidence of the doctor reviewing Lilli having a heightened awareness of the significance of this combination. Blood tests were taken but the results were not acted upon. There was clearly a window of opportunity to give antibiotics as soon as the elevated white cell count was discovered. Dr Hall opined there is no certainty that the outcome would have been different had antibiotics been given four to six hours earlier than they were, but the likelihood of survival was greater. Dr Hall stated that the commencement of antibiotics were unnecessarily delayed.

Presentation to GP

48. On Sunday 25 August 2013, one year and ten months after her splenectomy, Lilli's mother took Lilli to a GP, Dr Piotr Swierkowski (not the family's regular GP), advising that Lilli had been suffering from nausea, vomiting, headaches and neck pain. Interestingly, Dr Swierkowski worked part-time as a GP with his main position being the Executive Director of Medical Services at the Sunshine Coast Hospital and Health Service (SSCHHS).

49. Dr Swierkowski understood that Lilli was asplenic and therefore was potentially at a higher risk of contracting bacterial infections. He had the patient remain at the practice for a trial of oral rehydration to see if this would alleviate the headache. After twenty-five minutes this had not occurred and he was also unable to establish from Mrs Sweet whether Lilli had any additional immunisations that are offered after a splenectomy.

50. Dr Swierkowski referred Lilli to the Nambour Hospital Emergency Department for further assessment and treatment. Dr Swierkowski provided a letter which Dr Withers considered indicated all of the key information including that basic bloods should be taken and perhaps consultation with the paediatric team.

51. Dr Swierkowski says he referred Lilli to the hospital so that blood tests could be obtained fairly quickly even though this was on a Sunday, to rule in or out if there was an elevated white cell count. Although Dr Swierkowski thought that the symptoms were common manifestations of a viral illness, Dr Swierkowski expected further investigations to take place, including blood tests. Dr Swierkowski's review, referral decision and letter of referral were comprehensive and should have alerted the hospital that further investigation needed to be undertaken.

Hospital admission

52. Apart from the triage nurse it seems RN Christopher Watson saw Lilli first in the ED. RN Watson was given the history of asplenia. He says he spoke to Dr John Richards and received an order for EMLA cream (numbing cream used in the event an IV cannula was needed) and put this on the insides of Lilli's elbows. He stated he was concerned when he learnt that Dr Richards was going to discharge her but was later reassured when he learnt she was to be admitted.

53. Lilli was first seen by Dr John Richards, a senior emergency registrar at 13:30. It was identified to him that Lilli had a history of hereditary spherocytosis and a splenectomy.

54. During her stay in the ED, Lilli was treated for dehydration and given pain relief medication for her headaches, on the basis that she most likely had a viral infection and a form of viral gastroenteritis.

55. A decision was made by Dr Richards not to take bloods in the ED. With the benefit of hindsight Dr Richards agrees bloods should have been taken but he was of the view that clinically she had a viral illness. Dr Richards also gave evidence that he also took into account that Lilli did not look unwell and he needed to balance the benefits of taking blood against the risks including that of pain to the child and risk of infection at the cannula site.

56. To be fair to Dr Richards, Lilli was not displaying the classic symptoms of a bacterial infection. Her temperature was only slightly raised at 37.6 degrees, there was no rash, fever or capillary return. He also did not see other classic signs of meningitis. Vital sign observations of blood pressure, pulse, respiratory rate and oxygen saturations were within normal parameters. Her CEWT (Child Early Warning Tool) scores were low at 1 or 2 and not suggesting more emergent intervention. Hence a provisional diagnosis of a viral gastroenteritis was certainly open and trialling on oral fluids therefore appropriate. At the same time, as Dr Sullivan said in her evidence, there was only one episode of diarrhoea, which to her would not indicate viral gastroenteritis.

57. A differential diagnosis that Lilli was in fact suffering from a bacterial infection does not appear to have been considered by Dr Richards. It would seem that after the oral hydration trial failed and she vomited again, that was when the decision to admit Lilli to the ward was made. Dr Richards still did not consider it necessary at that time to order bloods and this is despite the red flag raised by the GP referral letter that bloods should be taken. This was a missed opportunity, which could have made a significant difference to the outcome.

58. Dr Richard's evidence was that he was always going to admit Lilli and for that reason ordered EMLA cream on the basis there may be a later need for insertion of cannulas. This contention seems to be contrary to the evidence of RN Watson but more particularly the evidence of Dr Ashleigh Sullivan. Although I had an impression of some hindsight bias in respect to some of the evidence of RN Watson, that was certainly not my impression of Dr Sullivan who was an impressive witness. Her recollection of a conversation she had with Dr Richards when he called to request the admission to the paediatric ward, was that he had planned to discharge Lilli but she had another vomit and he wanted to admit her for a period of observation. Dr Sullivan also recalls a discussion about the need to do blood tests and Dr Richards said Lilli looked too well to require blood tests and suggested Dr Sullivan make that decision after being assessed by her. Dr Sullivan was not told about the contents of the GP letter. Dr Richards was not able to recall specifically those aspects of the conversation other than that he had one with Dr Sullivan. Ultimately I accept the version of events as detailed by Dr Sullivan. Dr Sullivan also said that she had no impression from Dr Richards that she was to assess whether bloods were taken. She reasonably thought that if Dr Richards had thought it necessary he would have taken them.

59. Whatever may have been the case, Lilli was in fact admitted to the paediatric ward at 17:30 but was not seen by another doctor until 21:15 hours, 5.5 hours after a decision had been made for her to be admitted. An Interim Management Plan was prepared by Dr Richards noting routine observations and fluids to be applied. There was no reference to taking bloods.

60. Dr Richards was asked the extent to which the National Emergency Access Target (NEAT) contributed. His answer was somewhat equivocal but the impression was that there was pressure to push patients through the ED.

61. NEAT is based on the target that 90% of patients will leave an Emergency Department within four hours and be either discharged, admitted to a ward or transferred to another hospital. Dr Withers stated that pushing patients quickly through EDs without adequately thinking through what is transpiring often means that the ED physicians who are involved in the care simply do not have the opportunity to see the epilation of an illness. Dr Withers stated that looking at a child in snap shot can be absolute folly when looking at a child who is clinically deteriorating.

62. The SSCHHS identified in a response to Dr Hall's report that the state-wide treatment to meet NEAT targets, with the emphasis to move patients out of the emergency to inpatient areas, leaves patient outcomes vulnerable to risk if those inpatient areas do not have sufficiently safe resource levels and systems in place to ensure new patients are reviewed in a timely manner. The relatively recent emphasis in place on accelerating patient journeys puts the hospital on a relatively early phase in its learning curve and this is a state-wide issue for all public hospitals that are required to meet the NEAT targets.

63. This brought into focus the reasons why Dr Ashleigh Sullivan did not actually review Lilli during her shift that day, which commenced at 08:00 and finished at 20:30. As the paediatric registrar she was responsible for a number of duties and received referrals and requests for advice from the Nambour ED, other District hospitals, postnatal wards, birth suite, special care nursery and the paediatric ward. She described in detail her day and it is evident she had a very busy shift and simply did not have the time resources available to get to see Lilli. To come to the ward it had to be agreed that Lilli was clinically stable. Dr Sullivan was a relatively junior doctor and would have relied on the advice of Dr Richards who was very much more senior and experienced. Given her other priority cases that kept coming that afternoon it is accepted that Dr Sullivan may have felt some reassurance from the advice of Dr Richards. She was the only person performing multiple paediatric duties that afternoon and as a result of the workload and staff resources available Lilli was not reviewed in a timely manner.

64. This time in the hours after admission was also a missed opportunity to review the case and consider ordering bloods, largely due to two factors. Firstly, there was a systemic issue surrounding the staffing resources in the paediatric ward that day. Secondly, there was information that was missing in that Dr Sullivan was not informed of the GP referral letter by Dr Richards. Dr Sullivan told the court that if she had known about the contents of the letter she would have immediately taken bloods. That of course could be said to be with the benefit of hindsight but for the fact that both Dr Hall and Dr Withers also consider that objectively on its own, the referral letter to the GP was a sufficient red flag to warrant action being taken.

65. Dr Sullivan also discussed Lilli with the paediatric senior registrar Dr Diana Ting. Dr Ting gave her advice that she should have a 'low threshold' to perform intravenous cannulation and bloods even where there was a well looking child with stable observations.

66. Dr Sullivan would have received some further reassurance from the fact that RN Taylor had seen Lilli and recorded normal observations with no further vomiting and she was drinking oral fluids. As her shift was about to end she made a decision that Lilli would be reviewed by Dr Hermina Narvaez as soon as she commenced her shift. Dr Sullivan states in her statement that she advised Dr Narvaez at handover what Dr Richards had told her and about Dr Ting's advice about the low threshold to obtain IV access and take bloods.

67. Dr Sullivan told the Court that she has considered the outcome in this case every day. She believes she would now be more confident in formulating in her mind what should be done and getting things done. She also said she would now request a consultant to come in if a patient had been waiting for two hours.

68. Dr Hermina Narvaez, Paediatric House Officer saw Lilli after handover at about 20:45. Dr Narvaez was unable to give evidence at the inquest and unavoidably but regretfully I excused her. As a result there was a lost opportunity to obtain more information from her and to gain insight into what she was thinking during this shift and an explanation for her actions. We did have a statement from her taken close to the tragic events, as well as her notes in the medical record. Dr Narvaez noted there were normal observations and Lilli was afebrile. She thought Lilli did not look clinically unwell or septic and agreed with the diagnosis of viral gastroenteritis. She did however place a cannula and obtained a sample for a Full Blood Count.

69. Dr Narvaez received advice at midnight that the white cell blood count was 46.5. She recognised this was elevated and her statement says this surprised her as she thought Lilli did not look clinically unwell. What is surprising is that Dr Narvaez did not go back and review Lilli until four hours later at 04:00. It is evident there were other symptoms during the night, which should have also led to an earlier review. Analgesia was given during the evening and into the early morning with little relief to the reported headache and neck pain, which was progressively more severe. At the review at 04:00 she noted abdominal pain. Dr Narvaez prescribed low dose morphine. Dr Withers stated that this in itself should have raised a major alarm that headache pain was so severe that intravenous opiate medication was required. The later Root Cause Analysis came to a similar conclusion.

70. Dr Withers stated that Dr Narvaez failed to appreciate the significance of the history and associated problems this brought. Dr Withers opined it was difficult to imagine what thought processes were going through Dr Narvaez's mind, given the constellation of problems including severe headache, nausea, and white cell count of 46,000. Dr Hall and Dr Withers both stated that this very high white cell count was a clear indicator of bacterial infection requiring an immediate response including commencement of IV antibiotics. For reasons unexplained the Senior Registrar on-call and/or Paediatric consultant on-call were not approached by Dr Narvaez.

71. Dr Narvaez says in her statement that she intended to repeat the blood count to check the results and asked Lilli's mother about previous blood results and immunisation records and waited for Mrs Sweet to go home and bring them in. It is evident Dr Narvaez still did not think there was any urgency about the situation, as it was not expressed in those terms to Mrs Sweet. By the time Dr Narvaez provided handover at about 08:00 she told the oncoming team that Lilli had an elevated white cell count of 46.5 but that she had not been able to commence Lilli on IV antibiotics or repeat her bloods as Mrs Sweet had not

returned to the hospital. After handover Mrs Sweet returned to the ward and gave her Lilli's previous blood results, which were normal. Dr Narvaez states that she then went to Dr Laxmi Camadoo, the Consultant Paediatrician on the ward that morning, and asked her if she should start Lilli on IV antibiotics as she had planned earlier. She says Dr Camadoo asked her to hold off and that Dr Camadoo said she would review Lilli shortly in ward rounds. In fact Dr Camadoo did not see her shortly at all and it was not until 10:50 that this occurred.

72. Dr Camadoo recalls being concerned about the very high white cell count and thinking that they may have to look to exclude an oncology diagnosis such as leukaemia. She was aware that Lilli was asplenic.

73. Dr Camadoo decided to focus initially on the children who could be discharged that day so that they could clear some beds to enable the admission of backlogged children. Dr Camadoo thought that Lilli needed review soon, but not immediately.

74. Dr Camadoo was then informed of a deterioration in Lilli by Dr Narvaez and she asked Dr Ashleigh Sullivan, to see Lilli immediately. This occurred around 09:55 hours. Dr Camadoo had confidence in Dr Sullivan who she believed was very competent by way of an explanation as to why she did not conduct the review herself.

75. When reviewed by Dr Sullivan it was noted Lilli was now showing signs of further deterioration including a rash, high temperature, a stiff neck and a positive Kerning's sign for meningitis. Results from blood tests taken the previous evening were then noted by Dr Sullivan, including the markedly elevated white cell count. Dr Sullivan considered that Lilli had meningitis and commenced the antibiotic ceftriaxone. She ordered additional blood testing including a full blood count and cultures. She spoke to Dr Camadoo who requested she also administer vancomycin and to contact the infectious diseases team at the RCH for advice. Again, Dr Camadoo stated she would review Lilli as soon as she could.

76. Dr Camadoo stated that she completed the ward rounds in order of clinical priority recalling that it was a very busy morning. It is however surprising that it took her until 10:50 hours to actually review Lilli.

77. It appears that, by this time, the infection had progressed such that Lilli was now suffering from severe sepsis and had been for some time.

78. Doctors began treating Lilli for suspected bacterial meningitis and she was placed on one-to-one nursing care. Initially there were signs of some improvement. Dr Sullivan had spoken to the RCH and as recommended administered a further dose of ceftriaxone. At this stage Lilli did appear better and was sitting up in bed.

79. By Monday afternoon and despite further antibiotic treatment, Lilli began to deteriorate further. At 13:00 Lilli had an episode of odd posturing and tongue protrusion suspected as being from a seizure, and staff began preparing her for transfer to the RCH.

80. Shortly after, Lilli became unresponsive and required emergency resuscitation. Lilli was intubated, ventilated and transferred to the RCH, however by the time

of her arrival on Monday evening, she was unresponsive with fixed dilated pupils.

81. Tests conducted over the following day, Tuesday 27 August 2013, revealed that Lilli had suffered extensive brain injury consistent with brain death. Supportive care was withdrawn on Tuesday afternoon, and Lilli died shortly afterwards whilst being held by her mother.

82. Her cause of death was found to be brain stem herniation, due to or as a consequence of pneumococcal meningitis. Hereditary spheryocytosis and splenectomy were noted as significant contributory conditions.

Response by the hospital

83. In the course of the investigation Nambour Hospital were given an opportunity to respond. The hospital disagreed with many of the criticisms of Dr Hall.

84. The hospital agrees that the immunodeficiency was not recognised or clearly articulated in the notes and agrees with the conclusion that there may have been a missed window of opportunity. However, the hospital believes there is no certainty that the outcome would have been different if antibiotics had been administered earlier.

85. The hospital submitted there were a number of lost opportunities to commence antibiotic treatment by the hospital and also the GP.

86. It acknowledges that the high white cell count should have been acted upon earlier but submits that the failure to act was significantly contributed to by a systems issue in providing inadequate resourcing of staffing and escalation processes.

87. It also stated that Lilli's presentation was very subtle and in the setting of a clinically well looking child who was not displaying the classic signs and symptoms of bacterial meningitis. An earlier review may not have precipitated a change in treatment or the insertion of an IVC and taking bloods.

Root Cause Analysis

88. A Root Cause Analysis was conducted by the hospital. The RCA was in my view robust and noted a number of system issues that contributed to the tragic outcome. The RCA noted that appropriate investigations and definitive treatment were delayed and this directly contributed to the patient outcome. There was reference by a number of the staff about guidelines for treatment of asplenic patients. The RCA stated there was an absence of clear guidelines for patients, families and health professionals regarding prevention of severe sepsis in children post splenectomy, which contributed to gaps in pre-presentation care.

89. It was recommended that there needs to be developed a statewide clinical guideline for the prevention of severe sepsis in children post splenectomy.

90. It was further suggested that the lack of a Spleen registry (such as established in Victoria) that provides recommendations and information regarding management of asplenic or hyposplenic patients to patients, families and health

professionals increased the likelihood that care of the patient was fragmented and did not meet best practice standards.

91. It was recommended there be a review of potential benefits of a spleen registry including review of options and feasibility. That recommendation was taken up by Queensland Health and it has joined the Spleen Australia Register. Patients and GPs are provided with information in the form of an education kit on how to reduce the risk of infections, as well as vaccine and alert cards.

92. The RCA found that a lack of a system alert process to flag high risk patients (such as splenectomy patients) contributed to the required investigations and treatments not being commenced. The RCA team agreed that it was unreasonable to expect emergency and junior medical staff to be aware of all best practice standards especially in rare and complex cases.

93. It was recommended there be a review of options and feasibility of establishing a statewide alert process for high risk patients such as immuno-comprised patients.

94. The RCA also found that a critical blood result was called through to a single point (junior medical officer/after hours) and when this failed to result in the appropriate action/treatment there was no backup or alternative review of the result and this contributed to the patient outcome.

95. The recommendation was for SSCHHS to establish clear processes, procedures and systems-in line for tracking diagnostic results ensuring they had been received and reviewed and any action required is dealt with by the most appropriate position.

96. The RCA also found that the lack of formal guidelines for prescribing narcotics to children meant that morphine was prescribed for headache and neck pain without a provisional diagnosis for the cause of pain. This should have been a trigger to discuss with a senior medical officer.

97. It was recommended the SSCHHS sponsor a local review regarding the development of a framework for safe narcotic prescribing in children. On completion, the recommendations from the review were to be forwarded to the patient safety unit for consideration of statewide implications.

98. The RCA noted there were a number of lessons learnt. In this case the workload of the medical registrar resulted in the patient not being reviewed in the recommended time frame, and the lack of a formal escalation process meant that this issue was not escalated.

99. The lack of formal requirements for clinical handover for a junior/senior liaison increased the likelihood that the case was not discussed and the complex nature of the patient's history was not taken into account in the management of the patient.

100. A consultant paediatrician was not notified of the admission and the management plan for this high risk patient until the morning after admission. Therefore the patient was not reviewed by a senior paediatric medical officer until approximately 23 hours post presentation to the facility, when the patient deteriorated.

101. It was recognised that the speciality with the most familiarity with critical illness, the Intensive care Unit, was currently not taking a role in paediatric code blue emergencies, which may have contributed to delayed recognition and emergency treatment of raised intracranial pressure.

102. It was recognised that planning needs to take into account future capacity and capability to care for critically ill children.

103. Currently there is a lack of ongoing communication between the two medical facilities regarding the patient's condition, which may have contributed to delayed recognition and emergency treatment of raised intracranial pressure.

Actions taken since Lilli's death

104. After Lilli's death, the SSCHHS and the Queensland Department of Health implemented a number of recommendations for addressing gaps identified by that review.

105. The RCA identified that a critical diagnostic result was called to a single medical officer and this did not result in the appropriate action being taken. There was no backup or alternative review of the diagnostic results and this was a contributing cause to the outcome. The SSCHHS undertook a review and has now established clear processes, procedures and systems for tracking diagnostic results to ensure they are received, reviewed and actioned as required. Importantly, junior medical officers are now required to call through all abnormal results to senior medical officers.

106. The RCA investigation identified the paediatric service had a lack of formal guidelines for prescribing narcotics to children. A new procedure was developed. Prior to prescribing oral and parenteral opioids for moderate to severe pain, the medical officer is required to discuss the child and the clinical setting with a senior paediatric registrar or consultant.

107. The RCA investigation identified that Lilli was not reviewed within the four hour time period required for a paediatric patient when transferred on an Interim Management Plan (IMP). The SSCHHS did not have an escalation process to redress this. Two main measures have now been identified and introduced. Firstly, the health service increased junior paediatric medical officer staffing levels to two Principal House Officers (PHO) who are concurrently rostered on the evening shift, as the evening shift was identified as a busy admissions period for children to the paediatric ward. Further escalation pathways are now in place when the IMP time timeframe of four hours is not met or if a patient deteriorates without a PHO review. Nursing staff on the paediatric ward are required to escalate to the on-call consultant and/or paediatric registrar to come and review the patient.

108. SSCHHS have also introduced a *Code Blue-Paediatric, Obstetric and Neonatal Practice* which provides for ED medical officers and an anaesthetic registrar to attend a paediatric Code Blue with ICU to be contacted in the event an ED registrar cannot attend.

109. In relation to the clinical handover held the morning after Lilli's presentation, the RCA identified two issues. Firstly, there were no formal requirements in place requiring senior and junior medical officer liaison. Secondly, the complex nature of Lilli's history was not taken into account in the management of the patient.

The SSCHS reviewed the paediatric clinical handover processes and consultants are now required to be present at morning handovers on the weekend in alignment with standard clinical practice on weekdays. Further, on a daily basis the on-call consultant for the day shift does a handover to the evening and overnight on-call consultant. After the commencement of the night shift the consultant on-call telephones the night duty paediatric medical officer to check the inpatient status on the ward. Nurses now attend the morning clinical handover with medical officers to ensure both streams of health practitioners are informed about the care of patients.

110. The information referred to above is contained in a Paediatric Introduction pack for all new staff.

Conclusions

111. In reaching my conclusions it should be kept in mind that a coroner must not include in the findings or any comments or recommendations, statements that a person is or may be guilty of an offence or is or may be civilly liable for something. The focus is on discovering what happened, not on ascribing guilt, attributing blame or apportioning liability. The purpose is to inform the family and the public of how the deaths occurred with a view to reducing the likelihood of similar deaths.

112. The impact of hindsight bias and affected bias must also be considered when analysing the evidence. Hindsight and affected bias can occur where after an event has occurred, particularly where the outcome is serious, there is an inclination to see the event as predictable, despite there being few objective facts to support its prediction.

113. In most health care related adverse events there are usually multifactorial issues at play and a combination of system and human errors. Poor communication, poor documentation and a lack of safeguards can result in poor decisions being made.

114. The decision about the length of time to provide prophylactic antibiotics post-splenectomy should not be criticised because clearly the medical science on the issue is conflicting and reasonable decisions were made by Dr Borzi on the basis of the science/evidence then available.

115. The issue of ensuring Lilli was vaccinated with the additional vaccinations outside the usual schedule was not well managed, but given those additional vaccinations would not have covered the bacterial organism which caused Lilli's death, then that management cannot be said to be contributory to her death.

116. Nevertheless, this is one of those examples where poor communication and poor documentation contributed to Lilli not being fully vaccinated. All that was required was a letter in plain terms addressed to Lilli's GP and to her mother setting out the recommended vaccination schedule.

117. It should be noted that the introduction of the Spleen Australia Register and Queensland's adoption of it, as well as the change in practice being adopted by the medical personnel concerned in this aspect of Lilli's management and care, would have almost certainly ensured that Lilli was fully vaccinated.

118. In relation to the management and care provided by Nambour Hospital, it is evident a different outcome may have occurred if earlier action had been taken and the giving of antibiotics had occurred much earlier. It is accepted that Lilli was displaying many of the common signs of a viral illness for which antibiotics are not indicated. Lilli however was not a usual patient. She was asplenic and prone to bacterial infection. This information was clearly noted in the GP referral letter to the hospital. That letter suggested a pathway for treatment including blood tests and paediatric review. The suggested pathway was not acted upon and it should have. Blood tests should have been taken in the ED and if a high white cell count came back, antibiotics could have then been given.

119. That finding is not subject to hindsight bias because objectively Lilli was outside the range of usual patients and her specific circumstances should have been considered and this objectively warranted further investigation, as contemplated by Dr Swierkowski in his letter.

120. The fact that this did not occur in the ED was compounded by the resource taxed environment that was the Paediatric Ward that day. Due to competing priorities and contributed to by some assuredness given to Dr Sullivan by Dr Richards as to Lilli not being so unwell as to require blood tests, Dr Sullivan was not able to see Lilli on the ward before her shift ended. Not unreasonably, as her shift was coming to an end, she made a decision for Dr Narvaez to review her.

121. Dr Narvaez did review Lilli and ordered blood tests. When the results of those tests came back at midnight they were extraordinarily high in respect to a white cell count and this should have prompted immediate action by Dr Narvaez and antibiotics commenced and the on-call consultant or other senior doctor contacted. Neither occurred. To compound the situation Dr Narvaez in fact did not physically review Lilli for another four hours. In the meantime Lilli was continuing to experience headaches and other pain and was prescribed morphine for increasing headache by Dr Narvaez. This decision on its own should have prompted a review by Dr Narvaez and the consultant on-call should have been approached. No adequate explanation has been given as to these critical omissions.

122. By the time of handover to the morning shift not all of this information seems to have been passed on and comprehensively considered by the consultants and medical team taking over the next shift and there was a further delay in reviewing Lilli. At the time Dr Sullivan was asked to see her, Dr Sullivan immediately recognised meningitis symptoms and commenced antibiotics. The consultant Dr Camadoo still did not review Lilli for a further hour, although by this time it was clearly too late and in any event the appropriate treatment program had been commenced by Dr Sullivan and Dr Camadoo consulted.

123. Nambour Hospital and the SSCHHS conducted a comprehensive Root Cause Analysis and a number of systemic staffing issues and policy and guideline issues were identified and changes have resulted. It was noted from the evidence of a number of staff members that the recommendations have been largely implemented and are working well. In that respect it is not considered that any other recommendations need to be considered.

124. Mr Boyce, on behalf of Lilli's family, accepted the recommendations of the RCA and of Dr Withers. In addition they suggested there be a system in place that

allows doctors to check on children's immunisations on-line. That seems to be already in place with the Australian Childhood Immunisation Register and I note Dr Davoren made reference to his intention to utilise the register in the future if he was in any doubt.

125. A second recommendation sought related to training medical staff to listen to and utilise what parents are saying when considering diagnoses. Within Queensland Health and most private hospital systems, escalation processes (Ryan's Rule) have been put in place to provide a pathway for families to escalate their concerns if they feel they are not being acted upon. I am aware the process has been the subject of considerable training within Queensland Health and for that reason do not consider any further recommendation is needed.

126. A third recommendation looked at better education about asplenic patients and their susceptibility to OPSI. Queensland Health have since worked with Spleen Australia to develop a clinical guideline for the management of paediatric patients post splenectomy. Further, Queensland health has generated an asplenia/splenectomy clinical alert within individual Hospital Based Corporate Information Systems and intends to progress this to a state-wide system. In a letter published to medical practitioners on 18 November 2015, the Chief Health Officer referred doctors to these developments making specific reference, de-identified as to Lilli's name, to the inquest which was then taking place.

127. Given these important developments, which appear to have very much been considered as a result of Lilli's case, it is my view no further recommendations are required. It may be of some little comfort to Lilli's family that so much has been advanced as a result of her tragic death.

128. If Lilli had presented today at Nambour Hospital, ED staff would have had the benefit of the considerable knowledge now made available in clinical guidelines developed by Spleen Australia. When she was admitted to the Paediatric Ward there would have been two registrars, not one, available to review patients. If she had not been seen in a two hour timeline, nurses are empowered to escalate a review to the consultant on-call. When the abnormal blood tests results became known, procedures now provide for those results to be discussed with the consultant on-call. When a decision was made to initiate narcotic pain relief a senior doctor would review the decision and underlying causes. When the morning handover took place the process would now ensure involvement of the consultant, medical staff and nurses.

129. Lilli Sweet's death is difficult to comprehend in the circumstances that have been identified in this inquest. There were a number of individual judgment errors made that were compounded by systemic resource issues, which contributed to poor decisions. The changes made as a result of reviews of this case by the SSCHHS and Queensland Health are such that at some point it is likely that one of the safeguards now put in place would come into play. It is evident that many of the medical personnel have contemplated their actions and have been deeply affected by the death of Lilli. For her mother and family it must be agonising to think that earlier action at various points in the health care could and should have taken place with a much better prognosis for a better outcome. My condolences are expressed to Lilli's family.

Findings required by s. 45

Identity of the deceased – Lilli Sweet

How she died – Lilli was an asplenic child who was at risk of developing overwhelming sepsis. She was admitted to Nambour Hospital on referral by a GP. A provisional diagnosis of viral infection was made but no-one seems to have seriously considered that Lilli was also at risk of developing overwhelming sepsis from a bacterial infection. A bacterial infection was not tested for during the initial stages of her admission. When blood tests were ordered the results showed the presence of or likely developing overwhelming sepsis but these results were not acted upon until it was too late. There were a number of missed opportunities where action could have been taken earlier, which may have prevented her death occurring.

Place of death – Royal Children's Hospital HERSTON QLD 4006 AUSTRALIA

Date of death– 27 August 2013

Cause of death – 1(a) Brain stem herniation due to or as a consequence of pneumococcal meningitis

2 Hereditary spheryocytosis and plenectomy

I close the inquest.

John Lock
Deputy State Coroner
Brisbane
6 May 2016