CITATION: *Inquest into the death of Sara Lorraine Hampel* [2013] NTMC 025

TITLE OF COURT:	Coroners Court
JURISDICTION:	Darwin
FILE NO(s):	D0166/2011
DELIVERED ON:	20 November 2013
DELIVERED AT:	Darwin
HEARING DATE(s):	20 – 22 August 2013
FINDING OF:	Mr Greg Cavanagh SM
CATCHWORDS:	Sepsis, necrotising fasciitis, death in medical care

REPRESENTATION:

Counsel Assisting:	Mr Mark Thomas
Counsel for Dept. of Health:	Ms Amanda Taylor

Judgment category classification:	B
Judgement ID number:	[2013] NTMC 025
Number of paragraphs:	168
Number of pages:	57

IN THE CORONERS COURT
AT DARWIN IN THE NORTHERN
TERRITORY OF AUSTRALIA

No. D0166/2011

In the matter of an Inquest into the death of
SARA LORRAINE HAMPEL
ON 14 OCTOBER 2011
ONBOARD CAREFLIGHT AIRCRAFT
VH2LY

FINDINGS

(20 November 2013)

Mr Greg Cavanagh SM:

Introduction

1. Ms Sara Hampel gave birth to a healthy baby on 6 October 2011 at Gove District Hospital. It was a vaginal birth and an uncomplicated delivery. After the delivery Ms Hampel took regular doses of Paracetamol and Nurofen primarily as a result of dealing with a small injury to her perineum that occurred during the birth of her child.

2. On 9 October 2011 Ms Hampel was discharged from hospital with her newborn daughter.

3. On Wednesday 12 October 2011 Ms Hampel was having a shower at home when she called out to her husband to help her as she was feeling faint. He helped her out of the shower without any complications. About five minutes after getting out of the shower she said that she felt better and that she had no further problems in the night.

4. On Thursday 13 October 2011 at about 10.00pm Ms Hampel went to have a shower in her house. She called out for help. Her husband went to assist her and saw her falling within the shower cubicle and hitting her right knee on the wall. She did not lose consciousness and was helped out of the shower.

She said that she was feeling faint again. After a couple of minutes she said that she was feeling better however her right knee was sore. She had experienced no pain in the right knee prior to this incident.

5. At 6.15am on Friday 14 October 2011 Ms Sara Hampel arrived at Gove Hospital by ambulance. This occurred after she woke her husband during the night complaining of pain similar to cramp in her right leg below the knee. Her husband massaged her leg, she went to sleep but woke again at about 4.00am saying that the pain was back and getting worse. Her husband called an ambulance, which arrived at 5.55am and took her directly to the Hospital.

6. At Gove Hospital Ms Hampel was in extreme pain, crying and visibly upset and as the day progressed regularly screaming as a consequence of the severity of the pain. On examination, initially, she had a high heart rate and a high respiratory rate but did not have a fever. Her initial treating Doctor, Dr Sarah Luthy thought that it was likely that she had DVT (Deep Vein Thrombosis). However, she was not sure. An ultrasound test was conducted for the purpose of determining if this was in fact the case. The result, which was received at about 9.30am, indicated that she did not have DVT. A number of blood samples were obtained at about 6.30am. The results of the blood tests indicated that Ms Hampel's white blood cell count was low and deteriorating and that other parts of her blood were abnormal.

7. Ms Hampel's treating Doctor, after 8.00am and for the rest of the day until 4.30pm, was Dr Judith Gardiner. After DVT had been excluded and there was no clear explanation for the cause of her problem, Dr Gardiner was of the view that Ms Hampel should be transferred to Royal Darwin Hospital. She thought that she flagged this early (that is in the morning) with Ms Hampel and her husband. She telephoned the Royal Darwin Hospital on a number of occasions seeking the advice of a consultant. She was not able to speak to a consultant. Instead, she spoke to a Medical Registrar, Dr Anna Riddell. Differing accounts emerged between the Doctors as to what was

said between them and this will be the subject of commentary in these findings. In summary, four key matters emerged from Dr Gardiner's evidence as to the effect of her conversations with the Medical Registrar. They were:

(i) "No assistance with regard to the diagnosis of Ms Hampel medical problem was forthcoming.

(ii) Ms Hampel was to remain at Gove where further blood tests were to be done and the Registrar notified of the results.

(iii) In the absence of any clear diagnosis, no antibiotics were to be given to Ms Hampel.

(iv) The consultant, Dr Erana Gray, had been advised of the above."

8. After she had conversed with Dr Riddell on either two or three occasions Dr Gardiner was "very uncomfortable" and "at her wit's end" as to what to do. She was forced at one point to google "necrotising fasciitis" when that term was raised by Dr Riddell in an "off the cuff way" in conversation. At about 3.00pm, Dr Gardiner made the decision to transfer Ms Hampel to Darwin by aircraft. An aircraft arrived at Gove airport at 7.48pm and the medical crew from that aircraft arrived at Gove Hospital shortly after 8.00pm. The Doctors did what they could to stabilise Ms Hampel, however she was in significant difficulties. Between approximately 8.45/9.00pm and 10.00pm her health stabilised and a decision was made to transfer her by ambulance to the aircraft. This transfer occurred and she was placed on the aircraft. Once on board the aircraft there was a delay whilst the pilot burnt off excess fuel. While this occurred, Ms Hampel's health suddenly deteriorated and she suffered a cardiac arrest. She was pronounced dead at 11.45pm. She was 21 years old. She had previously been in good health.

9. The cause of Ms Hampel's death was sepsis. The source of the sepsis was necrotising fasciitis which had occurred consequent upon the introduction

into Ms Hampel's body of a bacterial organism known as Streptococcus pyogenes (Group A).

10. Streptococcus Group A (hereafter GAS) is not rare. Up to 10-15% of humans carry it on them without causing any problems to them. It is not clear why GAS may suddenly turn lethal.

11. Sepsis is not rare. A useful definition of it is a:

> "potentially life-threatening complication of an infection. Sepsis occurs when chemicals released into the bloodstream to fight the infection trigger inflammation throughout the body. The inflammation can trigger a cascade of changes that can damage multiple organ systems, causing them to fail"[1].

12. Necrotising fasciitis is rare. It is commonly known as a flesh-eating disease or flesh-eating bacteria syndrome. It is an infection of the deeper layers of the skin and subcutaneous tissues, easily spreading across the fascial plane within the subcutaneous tissue. It is quickly progressing and must be dealt with immediately or close to immediately through, initially, the administration of antibiotics and then surgery. In Ms Hampel's case, sepsis was not seriously considered to be a possible diagnosis until about 5.00pm. Antibiotics were administered for the first time at 6.02pm. By this time it would appear to have been too late to save Ms Hampel's life. It was not until shortly after 8.00pm that sepsis was strongly suspected. This was the opinion of Dr Brook the Careflight doctor, an emergency specialist, who saw Ms Hampel soon after 8.00pm, and who was of the opinion that the blood results together with other features suggested sepsis with a real possibility of necrotising fasciitis.

13. The key issue in this case concerns the early recognition of sepsis and the failure of a diagnosis of that to occur until it was too late. Dr Gardiner, an obstetrician of 30 years' experience, needed help urgently to deal with this critical problem. She was, as she candidly put it, out of her depth. Dr

[1] Mayo Clinic website principle article on sepsis, Rochester, Minnesota, USA

Gardiner needed immediate, first rate assistance to diagnose the problem or, at the very least, to presume the existence of sepsis, and take appropriate action, which was straightforward - the immediate administration of antibiotics and the transfer of Ms Hampel to Darwin by aircraft for surgeons to excise the necrotising fasciitis and associated necrotic tissue. Suffice to say, the assistance that Dr Gardiner sought was not forthcoming.

14. Dr Markey, Head of Disease Surveillance, Centre for Disease Control, NT Department of Health gave evidence. He spoke of the nature of GAS (Group A streptococcus) as well as the activities of his Office in looking for GAS after this incident amongst other patients as well as staff at Gove Hospital. No GAS was found other than a very small quantity on Ms Hampel's husband, Mr Matthew Hampel. It was made clear through the evidence of Professor Baird[2] that because of the disparity in size, that Mr Hampel could not have transferred the GAS to his wife; it would have been the other way around.

15. Professor Baird and Dr Fordyce, both eminent senior doctors at Royal Darwin Hospital and both with a great deal of relevant expertise, gave evidence in an overview capacity. Both assessed the efforts of the doctors in this case and in particular, the failure of there to have been early recognition of sepsis. In addition, both doctors made many other useful observations of the efforts of medical staff in this case.

16. This matter has been the subject of an extensive overview by the Health Department of the Northern Territory and Gove Hospital in particular. Mr Gilchrist, the General Manager of Gove Hospital gave evidence in this inquest and provided a detailed document, which specifies the efforts made to deal with the impact of this death and the efforts that the Department has made to ensure that it does not happen again. In particular, particular

[2] Professor Baird is an Associate Professor but for the sake of brevity will be referred to as a Professor in these findings.

emphasis has been placed on the Department's sepsis recognition criteria, which it has been accepted, were inadequate at the time of Ms Hampel's death. In addition, a protocol has been put in place at Royal Darwin Hospital and Gove Hospital in relation to early recognition of sepsis.

17. Mr Mark Thomas appeared as Counsel Assisting and Ms Amanda Taylor appeared for the Northern Territory Department of Health. The death was investigated by Senior Constable Matthew McDonald. I received into evidence his thorough investigative brief, a folder containing Ms Hampel's medical records from Gove Hospital, Ms Hampel's birth certificate, and two folders containing medical documentation from the Department of Emergency Medicine. I also heard evidence from Mr Matthew Hampel, Dr Sarah Luthy, Dr Daniel Dwyer, Dr Marco Briceno, Dr Anna Riddell, Dr Judith Gardiner, Dr Erana Gray, Dr David Brook, Ms Michelle Martz, Mr Doug Gilchrist, Dr Peter Markey, Dr Paull Botterill, Dr James Fordyce and Associate Professor Robert Baird.

18. The husband and father of Ms Hampel were present throughout the inquest. Mr Hampel gave evidence and his father in law, Mr Nokes spoke to me at the end of inquest.

19. Pursuant to section 34 of the *Coroner's Act* (hereafter "the Act"), I am required to make the following findings:

> "(1) A coroner investigating –
>
> (a) a death shall, if possible, find –
>
> (i) the identity of the deceased person;
>
> (ii) the time and place of death;
>
> (iii) the cause of death;
>
> (iv) the particulars needed to register the death under the Births, Deaths and Marriages Registration Act;

20. Section 34(2) of the *Act* operates to extend my function as follows:

> "A coroner may comment on a matter, including public health or safety or the administration of justice, connected with the death or disaster being investigated."

21. Additionally, I may make recommendations pursuant to section 35(1), (2) & (3):

> "(1) A coroner may report to the Attorney-General on a death or disaster investigated by the coroner.
>
> (2) A coroner may make recommendations to the Attorney-General on a matter, including public health or safety or the administration of justice connected with a death or disaster investigated by the coroner.
>
> (3) A coroner shall report to the Commissioner of Police and Director of Public Prosecutions appointed under the Director of Public Prosecutions Act if the coroner believes that a crime may have been committed in connection with a death or disaster investigated by the coroner."

RELEVANT CIRCUMSTANCES SURROUNDING THE DEATH

Background of Ms Hampel

22. Ms Sara Hampel was born on 12 November 1989 in Loxton, South Australia. She was raised by her parents, Charles Nokes and Cheryl Nokes in Loxton. She completed her schooling at Loxton High School. In 2008 she attended TAFE in Adelaide and commenced a Diploma in Surveying. She completed this course in February 2010 and shortly thereafter commenced employment in Nhulunbuy with a surveying company. She married Matthew Hampel in February 2011 and lived with her husband in Nhulunbuy. She had commenced her relationship with Mr Hampel whilst at Loxton High School. She was delighted at the birth of their first child.

The day of the death- the events of Friday 14 October 2011

23. Dr Luthy was the first doctor who treated Ms Hampel. By coincidence she had been one of the doctors who had attended to Ms Hampel when she gave birth[3]. She was called in to suture the small, approximately 2 cm, vaginal gutter tear that Ms Hampel had sustained. She did so using a chlorhexidine wash and sterile gloves and a gown.

24. Dr Luthy examined Ms Hampel shortly after her admission and found that her temperature was 36.8 degrees, which meant that she didn't have a fever, which she defined as being generally around 37.5 degrees or more. Dr Luthy found that her pulse rate was 110 beats per minute (95 when settled), which was high. Her blood pressure was 110/60, which was normal as was her blood sugar level, which was 9.1. However, her right calf was extremely tender and her Homan's sign was positive. This is a test that is positive if a patient has deep vein thrombosis (DVT), however a positive reading does not necessarily indicate DVT. Dr Luthy ordered that a range of blood tests be taken and prescribed Clexane, which is an anti-coagulent. She also directed that an ultrasound test be conducted to determine if Ms Hampel had DVT, which was what Dr Luthy thought, at that point, was the most likely diagnosis. Dr Luthy also noted that Ms Hampel was not coping with the pain and knew that Ms Hampel had a severe morphine allergy. She therefore prescribed Tramadol, which was to be administered intraveneously.

25. Dr Luthy stated that she did not know at the time that she treated her that Ms Hampel had sepsis and did not suspect it for a range of reasons, which were:

    - "There was no obvious source of infection. Ms Hampel had not mentioned any problems with the vaginal gutter tear.
    - Ms Hampel's temperature was normal

[3] Dr Luthy said that she that she had attended at the last few minutes of birth.

- Her blood pressure was normal

- Her pulse was initially quite high but came down, when she "breathed through her pain", to less than 100 bpm.

Her respiratory rate went from about 30 breaths per minute on first admission and then came back down to about 18 breaths per minute, within the 45 minutes that Dr Luthy saw her"

Dr Judith Gardiner

26. At a point just before 8am Dr Luthy concluded work. Dr Judith Gardiner then took over care of Ms Hampel when she started her shift at 8.00am. Dr Gardiner had 30 years of experience as an obstetrician. She did not speak to Dr Luthy, however she did read Dr Luthy's notes regarding Ms Hampel. She noted that Ms Hampel had recently been transferred from Emergency to Obstetrics. Dr Gardiner carefully examined Ms Hampel shortly after 8.00am. Her first observation was that Ms Hampel was very distressed, with severe pain in the right leg. She was able to talk, however she remained extremely distressed, crying out and screaming in pain. Dr Gardiner acknowledged that she had described the pain level, at one point, as being "exquisite". Dr Gardiner noted that Ms Hampel's heart rate was high, at 100-110 beats per minute, which is termed tachycardic. Her respiration rate fluctuated from high to low to normal. The observation chart specified her respiratory rate as 21 breaths per minute at 8.00am and 26bpm at 8.40am. Dr Gardiner was aware that the presumptive diagnosis when she first saw Ms Hampel was deep vein thrombosis (DVT), which she viewed as reasonable in the circumstances, although the pain level was more severe than any patient that she had encountered who had DVT.

27. Dr Gardiner said that Ms Hampel was the subject of an ultrasound and x-ray at about 9.00am. She obtained the results informally from the radiographer almost immediately after the tests were completed, which would have been, on Dr Gardiner's estimates, at about 9.30am to 9.45am. The results ruled out both bone fractures and DVT. At about 10.30am Dr Gardiner said she got

the initial blood tests back. Significantly, the white blood cell counts were low, the platelets were low and an abnormal liver function was indicated. Specifically, Ms Hampel had lymphopenia, which is defined as a low level of lymphocytes in the blood. Lymphocytes are a type of white blood cell and are important for attacking an infection. Ms Hampel also had thrombocytopenia, which is defined as being a significant reduction in the number of platelets in the blood. Dr Gardiner then examined Ms Hampel again. She thinks that she probably flagged with Ms Hampel and her husband the prospect of going to Darwin at about this time (10.30am).

28. Dr Gardiner then endeavoured to telephone a consultant at Royal Darwin Hospital but was unable to do so and was put through to a Registrar, Dr Anna Riddell. This was the first of a number of conversations that Dr Gardiner was to have that day with Dr Riddell. This first conversation occurred, Dr Gardiner said, at about 11.30am and it may have, she said, consisted of two calls. Dr Gardiner explained the situation and said at the outset that a blood clot could be ruled out because it wasn't on the scan. Therefore the blood thinning medication that had already being prescribed could be stopped. Dr Gardiner discussed the pathology results with Dr Riddell and said that she (Dr Gardiner) would have had the observation sheet in front of her. Dr Gardiner noted that Dr Riddell had access to the pathology results on line and that she (Dr Gardiner) assisted Dr Riddell to see those results. Dr Gardiner said that Dr Riddell was concerned that Ms Hampel might have hepatitis due to the abnormal liver test results- Dr Riddell directed further blood tests in this regard. There was also some discussion between the doctors that concerned the question of excessive quantities of paracetamol being ingested by Ms Hampel in the preceding week, which might have impacted upon the blood results.

29. Dr Gardiner raised with Dr Riddell the critical question of transferring Ms Hampel to Darwin. However, Dr Riddell said no, she was happy to wait and see what the results of the further blood tests would be and that she would

speak to her consultant and show the consultant the results. Dr Gardiner added that she would have been trying to get a differential diagnosis from Dr Riddell but this question was compromised somewhat by the fact that the first blood test was obtained from a very small sample of blood as it had been difficult to collect.

30. Dr Gardiner said that after this first interaction with Dr Riddell she sought a second set of blood samples, which were marked "urgent" by her and the samples collected at about 12.20pm. Dr Gardiner said that the results were probably obtained at about 1.00pm to 1.30pm.

31. A vital matter concerning the second blood results was the C-reactive Protein result. C-reactive protein is a protein found in the blood, the levels of which rise in response to inflammation. If the levels are high it is a very good sign that there is an infection in the body. The normal range of C-reactive protein is less than 7 mg/litre. The Gove Hospital computerised records stated that C-reactive protein was first collected at 6.30am on the 14 October. The result was 361.8 mg/l. The second collection time was stated on the computerised records as being 16.50hrs which delivered a result of > 270 mg/l. The clinical notes first refer to the CRP results in a notation that was made at 2pm. In relation to the CRP results Dr Gardiner said there was a delay in obtaining the results of the first test so that that result did come through until the time of the result of the second blood test.

32. Dr Gardiner was very worried at the second blood results. She still had no diagnosis. She said that the problem was beyond her depth. She could get no help from any other doctors that day as it was so busy at the hospital. She telephoned Dr Riddell again at about 2.00pm because she wanted to have a firm differential diagnosis. Dr Gardiner raised, again, the question of transferring Ms Hampel to Darwin. Dr Gardiner said that the question of a possible diagnosis was discussed by them at this time, which included the possibility of an infection. Dr Gardiner said that it was noted that there no

fever but that she said to Dr Riddell that the reason for that may be as a consequence of her low white cell count and her low liver site count. Dr Gardiner raised the matter of starting Ms Hampel on some presumptive antibiotics, however Dr Riddell was reluctant to do this in the absence of any definite site of an infection. Dr Gardiner added, that she said to Dr Riddell that Ms Hampel was extremely distressed.

33. Dr Gardiner said that she was getting somewhat desperate. She said that Dr Riddell mentioned in an "off the cuff" sort of a way, "Oh, it's not necrotising fasciitis, is it?" Dr Gardiner had no clinical experience of this and asked what clinical features to look for. Dr Riddell said that she should look for an area of necrosis (dead tissue) in the leg as well as a difference in blood supply from one leg to the other. Dr Gardiner said that after she spoke to Dr Riddell she checked both capillary return and pulses in the legs as well as for a site of necrosis (dead tissue). She could find no difference in blood supply to the legs, nor a necrotic site, and that included looking at the stitched area in the perineum.

34. Dr Gardiner said that Dr Riddell said (during the course of this conversation) that she had spoken to the consultant, who had seen all the results, and was in agreement with what Dr Riddell was saying. Dr Gardiner said that Dr Riddell merely recommended that further blood tests be done in the evening, adding that Dr Riddell did not want Ms Hampel to be transferred to Darwin. Dr Gardiner said that Dr Riddell wanted to be notified of the results.

35. Dr Gardiner said that she felt very uncomfortable after this conversation. She was so concerned that she googled "necrotising fasciitis". She felt that she was at her wit's end and that she was way out of her depth. Dr Gardiner said that Ms Hampel remained very distressed despite high level of pain relief. Her blood results were clearly indicative that something was very wrong. Dr Gardiner then made the decision, of her own volition and without

speaking to anyone, to transfer Ms Hampel to Darwin. At about 3.00pm she telephoned Dr Riddell again and said that Ms Hampel was to be transferred to Darwin. Dr Gardiner said to Dr Riddell that she (Dr Gardiner) was not happy with Ms Hampel remaining in Gove, that Ms Hampel was deteriorating and that she needed to go to Darwin.

36. Dr Gardiner then called Dr Munzel who was the District Medical Officer for Gove at that time. She did so to facilitate the transfer of Ms Hampel on to a Careflight aircraft. She informed him that she had a patient who required transfer to Darwin. She could not recall whether she was involved in the decision concerning what priority Ms Hampel was to have in terms of Careflight. Dr Munzel then offered to do this for her. P3 was the initial priority that was noted on a DMO consultation/referral tasking sheet form for Ms Hampel, which was forwarded to Careflight. Dr Gardiner then dealt with other paperwork such as collating the notes and ensuring that there was a discharge summary. In hindsight, Dr Gardiner said that the initial priority of P3 should have been higher.

37. Dr Gardiner said that she had extensive experience with sepsis but no prior experience with necrotising fasciitis. She said that sepsis was only included as a differential diagnosis and was merely specified as a possibility.

38. Dr Gardiner finished her shift at 4.30pm and handed over the clinical management of Ms Hampel to Dr Dwyer at about 4.00pm to give her a chance to finish the paperwork.

39. Dr Gardiner admitted that she failed to monitor the urine output of Ms Hampel for most of the day, until about 3.00pm, when a decision was made to put a catheter in Ms Hampel. Dr Gardiner said that Ms Hampel had not passed urine from when she arrived at the ward at 8.00am until 3.00pm.

40. Finally, Dr Gardiner noted that the nursing staff were filling out the observations chart of Ms Hampel during the day.

Dr Anna Riddell

41. Dr Riddell says that she made a short undated statement in this matter a short time after the incident although she cannot recall when. She said that the statement was made from her memory. She had made some notes at the time of the incident but she later threw them away prior to making the statement.

42. Dr Riddell says that she was phoned by Dr Gardiner early in the day at about 8.00am to 8.30am.Dr Riddell said that Dr Gardiner outlined the case and that they discussed the blood results, which were abnormal. Dr Riddell said that she looked them up on the computer and would ring Dr Gardiner back with a plan.

43. Dr Riddell said that she did phone Dr Gardiner back, about an hour after the first call-at about 9.30am. Dr Riddell noted that the blood results indicated lymphopenia (low white blood cell count) amongst other things. Dr Riddell said that a hepatitis screen should be done as well as checking of the paracetamol levels. Dr Riddell said that Dr Gardiner said that Ms Hampel was looking well although she was tachycardic. Dr Riddell further stated that Ms Hampel was without a fever and was hemodynamically stable, which meant that her blood pressure and other observations were normal. She acknowledged that she said in her statement that the clinical examination was normal, except for the right leg, which was tender and swollen. Nevertheless, Dr Riddell said that at this point she did not know what the problem was. Initially, when she gave evidence Dr Riddell said that she thought that Ms Hampel should be transferred to Darwin at the time of this call-at about 9.30am. A short time later she clarified this and said that the decision to transfer Ms Hampel was made at the time of the third call, at about 12.30pm.

44. In the 12.30pm conversation Dr Riddell said that she was aware of the CRP result at this point and that the repeat blood results were worse. Dr Riddell said that Ms Hampel remained tachycardic but was otherwise stable. Dr Riddell said that she discussed possible differentials (causes), which included sepsis, haemolysis (rupture of red blood cells and release of their contents into the plasma) and, finally, limb ischaemia (restriction of blood supply to a particular limb). She also said that they discussed inserting a urinary catheter to monitor fluid balance and urine output. Further, Dr Riddell said that they discussed a septic infection screen.

45. Dr Riddell said that after this conversation, she spoke to Dr Gray on one occasion. Dr Riddell said that she did not have any notes remaining of this conversation with Dr Gray nor did she have any notes of her conversations with Dr Gardiner. She said that she did have notes but she threw them out.

46. Dr Riddell said that she was not able to see any observation charts however she did see the blood results. She said that she was at the time familiar with sepsis as it was a common presentation. She had dealt with it in 50 to 100 cases. She said that sepsis did cross her mind in this case hence her ordering a septic screen.

47. Dr Riddell said that she did not consider administering antibiotics because she was told she didn't look unwell and was reported as being stable. She thought that she would wait and see the results of the infection screen.

48. Dr Riddell said that she did mention whether it could be necrotising fasciitis, which she had experienced once previously in England. However, she said that she did not mention it in an offhanded way. Dr Riddell said that she explained to Dr Gardiner what it would look like.

49. Regarding C-reactive protein, Dr Riddell said that she remembered seeing a high CRP result in the later blood results. She thought that there could be different reasons for a high CRP one of which was infection.

50. Dr Riddell denied that she had said to Dr Gardiner that Ms Hampel was to remain in Gove.

51. Counsel Assisting asked Dr Riddell whether the combination of :

- a low white blood cell count
- a very high CRP
- a high heart rate
- a high respiratory rate

indicated sepsis. Dr Riddell responded that she wasn't aware of the high respiratory rate, but in any event the presence of these factors would not in her mind necessarily indicate sepsis. She thought that it was a possibility but that there could be other explanations especially given that Ms Hampel had recently given birth. Dr Riddell wasn't sure if she discussed the question of sepsis with Dr Gray. Dr Riddell clarified that her conversation with Dr Erana Gray was in person and lasted for between five to ten minutes.

52. Regarding the sepsis protocol, Dr Riddell said that she was aware of a surviving sepsis campaign, however, she did not check on the internet whether Ms Hampel's presentation would fit within the diagnostic criteria.

53. Regarding the nature of her conversation with Dr Gray, Dr Riddell said that she said that there were certain things that did not add up and that she thought that she should be transferred to Darwin for further investigation. Dr Gray, she said agreed with this. Regarding antibiotics, Dr Riddell said that she may have discussed this with Dr Gray in which Dr Riddell said that given it was not clear that it was an infection they should delay antibiotics. Dr Riddell said that she had no recollection as to whether Dr Gray expressed a view as to what the problem most likely was. Dr Riddell said that the main reason she spoke to Dr Gray was regarding agreement to the transfer to Darwin.

54. Dr Riddell admitted that at the end of the day she did not know what the cause of Ms Hampel's ill-health was.

Dr Erana Gray

55. The initial part of Dr Gray's evidence can be summarised as follows:

- She was a general and infectious disease physician who was admitted to a Fellow of the Royal Australasian College of Physicians and became a consultant in 2011.
- She was working as a consultant at the time Ms Hampel's matter was drawn to her attention.
- She made a statement in the matter on 7 August 2013. She had not previously made any notes.
- On the 14 October 2011 she recalls having either one or two conversations with Dr Riddell in relation to this matter. She did not recall if it was morning or afternoon. She though that the conversation/s was or were possibly very short.
- She said that Dr Riddell told her that Ms Hampel was well and afebrile but had knee or leg pain and abnormalities on her blood results including a raised CRP. She could not recall the details of the abnormal blood results.
- She was aware the DVT had been excluded and that Ms Hampel had given birth a week before.
- She recalled accepting the transfer of Ms Hampel to Darwin.
- She read Dr Riddell's statement prior to making her statement.
- She did not recall seeing any blood results or any early warning signs or charts.

56. On the subject of sepsis Dr Gray said:

> "We were not asked about sepsis. I think the conversation was around 'There's a lady and we don't know what is wrong with her. Will you accept her transfer so that we can work out what is wrong?' No, they won't asking if she was septic."

57. It would appear from this response Dr Gray did not raise the question of sepsis. She said that she understood that Ms Hampel was well and afebrile and hence there would be time to "bring her across and work out what is wrong."

58. Dr Gray denied that she had received a whole lot of information that suggested strongly that Ms Hampel was sick. She did not recall hearing that Ms Hampel was screaming in pain, that her heart rate was high and that her respiratory rate was high. She did not recall being given observations data.

59. She did recall that the CRP was high and that her blood levels were abnormal. Mr Thomas put to her "well what about the high CRP in combination with other factors such as high heart rate, respiratory rate, screaming in pain?". Her answer was "I don't think I was given the obs." She was pressed on this and conceded that she did not ask for them either. Dr Gray said that she was focusing on whether it was appropriate to transfer Ms Hampel.

60. Dr Gray said that she was not aware of Dr Gardiner's version of events, which was, relevantly, that Dr Riddell said that the patient was to remain at Gove. Dr Gray said that question put to her was would she accept transfer and she said yes.

61. Dr Gray stated that she had at that time extensive experience with sepsis. She had also encountered necrotising fasciitis before on many occasions.

62. She agreed eventually that if necrotising fasciitis is suspected that the preferable way to treat it is via antibiotics first followed by surgery. Dr

Gray agreed that the question of necrotising fasciitis did not cross her mind in respect of this case.

63. Dr Gray stated, finally, that she could receive 20 phone calls in a day on top of conducting clinics as well as dealing with her patient load on the ward.

Dr Daniel Dwyer

64. Dr Dwyer commenced work at the hospital at 8.00am on 14 October and at 4pm in the Obstetrics where Ms Hampel was. He was aware of Ms Hampel from his work earlier on in the day. He received a verbal handover from Dr Gardiner. He was aware that Ms Hampel:

- had markedly elevated CRP (361mg/l)
- was to fly out on medical evacuation via Careflight.
- not been placed on antibiotics
- was not feverish
- white blood cell levels and platelets were reducing in number, that is, they were worsening.

65. Dr Dwyer examined Ms Hampel at 4.15pm. She had a rapid heart rate of 120-130 bpm. . She also had a rapid respiration rate of 30-40 breaths per minute (tachypnoea). Her temp was 36.7 degrees C, but she had normal blood pressure of 110/70. She was complaining of nausea.

66. He examined the right leg closely. It was very tender along its entirety. It was moderately swollen compared to the left leg. It was not pale, cold or ischaemic. "Ischaemic" means restricted blood supply to the tissue. The right leg did not have that appearance, nor was there inflammation, redness

or an open wound of the right leg. Dr Dwyer could not feel any femoral [4]pulses bilaterally but he could faintly feel dorsalis pedis pulses in both feet.

67. Dr Dwyer noted an indwelling catheter, which is a tube in the bladder, that had drained about 600ml of brown coloured urine. The urinalysis showed blood in the urine. There was also bilirubin in the urine.

68. Dr Dwyer said that one of the potential diagnoses that he was considering at the time was HELLP syndrome (haemolysis liver enzymes and low platelets), which is a variant of preeclampsia (a multiorgan disease associated with pregnancy). Dr Dwyer stated that he thought that HELLP was a possibility as Ms Hampel had abnormal liver tests and low platelets and was mildly anaemic, all of which are indicators of HELLP syndrome. However, he observed that she did not have high blood pressure, which was inconsistent with that diagnosis.

69. Dr Dwyer considered at the time that sepsis was potentially a likely diagnosis, principally because of her very high CRP reading. Dr Dwyer said that the very high CRP reading was an indicator of inflammation and infection. He said that a high CRP doesn't give a definitive answer but it tells us that the body is fighting off infection or is mounting an inflammatory response. He had seen numerous sepsis cases in Gove. Dr Dwyer was aware that the first response to sepsis was the administration of antibiotics. He added that he had not had a case of necrotising fasciitis before. He was aware that Royal Darwin had advised for Ms Hampel not to start antibiotics.

70. Dr Dwyer inserted a second intravenous line for the purpose of obtaining further blood samples. Dr Dwyer said that this was done as for very unwell patients. Multiple intravenous lines meant that multiple fluids and drugs could be given at the same time. He said that the patient was clearly unwell and getting worse. Further, Dr Dwyer said that Careflight had a policy of

[4] The femoral pulses are located in the groin

two intravenous lines. Blood samples were done and they were sent urgently to pathology at 4.50pm. Dr Dwyer arranged for Ms Hampel to be moved to a room whereby she could get one on one care until she was evacuated. She was then transferred to bed 1 of Ward 1. He was initially informed that the Careflight team was expected at approximately 7.00pm. Apart from a brief period between 7.00pm and 7.30pm Dr Dwyer remained on Ward 1 until the patient left the hospital.

71. Between 5.00pm and 5.40pm Dr Dwyer spoke to an unnamed male Emergency Department (ED) consultant at Royal Darwin Hospital. Dr Dwyer acknowledged that at this time he still did not have a definite diagnosis, merely four possibilities, namely, HELLP syndrome, necrotising fasciitis, TTP/Vasculitis and, finally, ischemic limb. Dr Dwyer said that either he or the ED consultant (he can't remember whom) recommended an antibiotic called Meropenem to deal with sepsis and in particular necrotising fasciitis. This drug, the first antibiotic to be administered to Ms Hampel, was given to her at 6.02pm.

72. Dr Dwyer observed that to his knowledge proof of necrotising fasciitis could only be obtained via biopsy after surgery or post mortem. As regarding definite proof of sepsis Dr Dwyer observed that it is confirmed when a bacteria is cultured. However, Dr Dwyer noted that the most common clinical sign of sepsis is fever, which had not been present throughout the day; however, he was aware (at the time) that sepsis could be present without a fever.

73. Dr Dwyer said that he then received a call from a Careflight nurse for an update of the Ms Hampel's progress. In particular she asked about whether there was evidence of DIC (disseminated intravascular coagulation), a very dangerous condition, which can be a complication of HELLP syndrome. Dr Dwyer said that he can't recall requesting a doctor to be on the Careflight aircraft. He can't remember who made the decision to bring a doctor. Soon

after, Dr Marco Briceno who was the on call DMO for GDH (after 4.21pm) said to Dr Dwyer that Careflight had upgraded the retrieval priority and were bringing a medical escort.

74. Dr Dwyer also received a telephone call (between 5.00pm and 5.40pm) from the Gove Hospital pathology scientist who said that the latest blood results showed acanthocytosis (spiky red blood cells) and impending haemolysis (rupturing of the red blood cells). Haemolysis would lead to anaemia and is a feature of HELLP syndrome, which Dr Dwyer said leant more weight to that diagnosis.

75. Ms Hampel was given a non-antibiotic drug named Metoclopramide at 5.10pm to deal with her nausea. Fentanyl, an opioid analgesic drug and another non-antibiotic, was given to Ms Hampel at 6.02pm, 6.13pm and 8.21pm to deal with the relief of her pain.

76. At a point prior to 7.00pm Dr Dwyer contacted Careflight logistics for an updated arrival time, which was stated to be 7.45pm.

77. At about 7.30pm Dr Dwyer reviewed Ms Hampel. She looked worse. There had been no urine output for the previous hour. She appeared sweaty again, pale and drowsy. Her blood pressure was 89/55 and heart rate had gone up to 140bpm.Her right leg examination was unchanged. Dr Dwyer was of the view that Ms Hampel had undergone a marked and sudden deterioration on top of the gradual decline throughout the day. He thought it was a pre-arrest situation. He gave her some intravenous fluids rapidly and collected blood for urgent venous gas assessment. Venous blood gas was necessary to determine the acid base level of the blood essentially.

78. At 7.45pm the ETA of the Careflight aircraft was put back to 8.05pm. Further blood results were obtained. The Ph level was 6.98 which indicated that Ms Hampel had acidosis (her blood was acidic). Her potassium level was 9.9mm/l which was exceptionally high and not life sustaining, her

lactate was elevated at 9.2mm/l, which was high and consistent with the acidosis, and her Base Excess was minus 21.4,which was very significantly negative and indicative of serious acid base imbalance. Her platelet levels were 17, which was a very low reading. Renal function had worsened and Ms Hampel did not pass urine from this point. In short, Dr Dwyer was of the opinion that Ms Hampel was critically ill, her body was at this point very close to shut down and that life could not be sustained for long. Dr Dwyer was of course still not sure of what was wrong with her.

79. Dr Dwyer called Dr Briceno for urgent assistance. Ms Hampel's oxygen was increased to 15L/min via a non rebreather mask which improved her blood pressure to 98/53.

80. At about 8.05pm the Careflight team arrived which included retrieval physician Dr David Brook. Ms Hampel at this point was clearly far too unstable to go on to the aircraft. A central line and an arterial line were inserted into Ms Hampel to aid the application of more drugs and a greater quantity of them. A further antibiotic, Lincomycin, was given to Ms Hampel at 8.57pm. Further blood gas results at 9.00pm showed an improvement in the Ph level and potassium, which had dropped to 4.2. However, all results were still of concern, especially the lactate at 9.7mmol/l, but nevertheless some stabilisation had occurred.

81. Ms Hampel developed a low grade fever (37.8 degrees) at 8.35pm. Dr Dwyer and Dr Brooke dealt with Ms Hampel in such a fashion that they succeeded in securing the relative and continued stabilisation of Ms Hampel.

82. At about 10.00pm, after a period of waiting for an ambulance crew to finish their job and for the Careflight crew to sort out escort and baby arrangements, Ms Hampel was placed in an ambulance to be transported to Gove Airport.

Dr Marco Briceno

83. Dr Briceno was the District Medical officer for East Arnhem Land Region from 4.21pm onwards on Friday 14 October. He received a detailed handover from his predecessor Dr Brendan Munzel at 4.21pm.

84. Dr Briceno said that there were three patients in Gove Hospital at this time awaiting transfer to Royal Darwin Hospital. They can be summarised as follows:

    1. Male 40s. with renal trauma. Stable. Needed CT scan and surgical review.

    2. Female. Three week post natal. 30s. Acute appendicitis. Stable. Needed surgery.

    3. Mrs Hampel.

85. There was a fourth patient at Maningrida but Dr Briceno was not in charge of this patient.

86. All three Gove patients had been initially tasked as P3s and nurse only flights.P3 meant at that time that the patient was to retrieved by aircraft within six hours. P2 meant at that time, retrieved by aircraft within two hours. P1 meant retrieved by aircraft within an hour. Dr Briceno said that Dr Munzel had made these priorities. Later, at about 5.30pm Ms Hampel was upgraded to P2 after Dr Briceno spoke to Careflight. This meant that she was to have a doctor escort.

87. Dr Briceno said that the plan that they were offered by Careflight was because there were no aircraft at Gove, the quickest they could get there was 7.00pm regardless of priority. He said that when they decided to upgrade the priority Careflight said that he could send a second plane with a doctor who would arrive at about the same time. Dr Briceno made a recommendation that Ms Hampel be on the same aircraft as the lady who had appendicitis.

88. At about 7.30pm to 7.40pm Dr Briceno received an urgent call from Dr Dwyer who was very worried about Ms Hampel. He attended to her. Dr Briceno said that the Careflight team arrived at about 8.00pm and Dr Brook who was ICU specialist took over the arterial line and central line insertion.

89. Dr Briceno then said to Careflight logistics (who at that time were non-medical personnel) that he thought that Ms Hampel should go alone and not with the other lady due to her critical condition. Dr Briceno understood that this decision was for Dr Brook. However, Dr Briceno was surprised in that one of the two aircraft that arrived at Gove took off at about 8.15pm with the man with renal trauma on it. Dr Briceno asked Careflight if the plane could be turned around. He was told by Careflight that it could not be. He then contacted the Darwin DMO and had a discussion regarding priorities. A decision[5] was then made to permit the plane to go to Maningrida and then to Darwin. Meanwhile the other aircraft would take the two females to Darwin directly as the other lady was relatively stable.

Dr David Brook

90. Dr Brook was the retrieval medical officer on the Careflight Team that went out to Gove from Darwin. Dr Brook said that the decision to upgrade the priority classification (for Careflight) of Ms Hampel was made by himself and either Dr Briceno or Dr Munzel. When Dr Brook arrived at Gove Hospital at shortly after 8.00pm he spoke to Dr Dwyer and immediately the two doctors worked together to endeavour to keep Ms Hampel alive. Dr Brook agreed that when he first saw Ms Hampel she appeared critically unwell. She was close to death. Dr Brook was more of the view that the blood results suggested sepsis and that it was unlikely to be HELLP syndrome as the Obstetrics and Gynaecology expert that he spoke to while he was in Darwin thought this unlikely as it had been more than a week since the birth. Dr Brook had a lot of experience with sepsis and knew that

[5] Dr Briceno thought that it was Dr Brook who made this decision in relation to the revised plan.

highly elevated CRP levels were a strong indicator of severe inflammation or sepsis.

91. Dr Brook said that he had only one previous case of necrotising fasciitis but was of the opinion that the swelling and pain was severe enough to be necrotising fasciitis.

92. Dr Brook confirmed that Ms Hampel was not initially well enough to travel. He noted the highly elevated lactate and a Ph of 6.9, which was a result of of insufficient blood flow.

93. Dr Brook then assisted Dr Dwyer in administering various drugs to Ms Hampel, which produced a positive result, as previously noted. Dr Brook added that this improvement occurred in the space of 20 minutes with Ms Hampel's heart rate settling to 110 and her respiratory rate to 20. She became alert and orientated, sitting up, and asking to eat and drink. Dr Brook decided that the patient, while still septic and unwell had improved to the point where she was stable enough to be transferred to RDH. He made the decision not to intubate her at this point given the marked improvement in her in a short space of time on the back of relatively small fluid bolus and slow rate of adrenaline.

94. Shortly after Ms Hampel had been loaded onto the plane there a slight delay of about 15-20 minutes whilst the pilot burnt off excess fuel. Furthermore, shortly after she got onto the plane Ms Hampel began to deteriorate. This was at about 11.20pm. A couple of minutes earlier she had been conversing with her husband about where to find nappies. Dr Brook treated her with a saline solution, albumin and a drug called metaraminol. While preparing to intubate her she went into cardio-respiratory arrest at about 11.25pm. Initially it was narrow complex tachycardia (180 beats per minute). Dr Brook and his assistants tried five cycles of CPR/adrenaline for two to three minutes each but Ms Hampel continued to deteriorate. By this time she had fixed dilated pupils, no respiratory effect and was in a narrow bradycardia of

less than 10 beats per minute. Dr Brook pronounced Ms Hampel deceased at 11.45pm.

Ms Michelle Martz

95. Ms Martz was the team leader of the logistics unit at Careflight. As at 14 October 2011 there was a five level categorisation system of priority for a patient on a Careflight aircraft. This was specified by her as follows ("wheels off"[6] response):

    P1- 30 minutes

    P2- 2 hours

    P3- 6 hours

    P4- 24 hours

    P5- 48 hours.

96. Ms Martz pointed out that from February 2012 the system had changed in respect to what had been categories P4 and P5, which she said were now referred to as low acutity patients. Further, as at 14 October 2011 the District Medical Officer made the overall decision concerning prioritisation. Now (since February, 2012) Careflight employs a retrieval consultant who is a medical practitioner. The medical retrieval consultant has responsibility for the P1, P2 and P3 patients. The low acuity patients remain under the clinical oversight of the District Medical Officer until such time as they are moved by low acuity aircraft.

97. In reference to this matter Ms Martz said that she was not involved in coordinating the flights. However, she had put together an analysis of Careflight's response.

---

[6] A 'wheels off' response meant getting the plane to the target within a specified time. For example a P3 would mean getting a plane there within 6 hours of the phone call requesting it.

98. Ms Martz said that the records showed a request at 3.26pm from the Gove DMO (at that time), Dr Munzel as a P3 nurse only operation. There were two aircraft in operation–both were on missions at this time, one in Darwin, the other probably in Katherine. Both aircraft had a maximum capacity of two patients each on stretchers (with potentially another patient sitting upright). The estimated time from Darwin to Gove would be an hour and a half, depending on wind direction and weather.

99. Ms Martz said that the original plan was to use the Gove aircraft which was in the late afternoon in Darwin to go to Gove and pick up Ms Hampel and a male renal patient. Estimated arrival time in Gove was 7.00pm.

100. This plan changed when another three patients were referred to Careflight, they being a child in Katherine, a lady in Gove and a man at Maningrida. It was noted that the two ladies had young breastfeeding children. A further development was to put a doctor on the flight to pick up Ms Hampel. A conference call was arranged between the two DMOs (for Gove and Darwin) to determine if the plan needed to change. The aircraft destined for Ms Hampel then arrived at Gove at 7.48pm.

EVIDENCE CONCERNING EVENTS SUBSEQUENT TO 14 OCTOBER, 2011

Post Mortem - 18 October 2011

101. Dr Botterill conducted the autopsy. He noted the following matters:

1. "The presence of Streptococcus pyogenes (Group A) bacteria in the right thigh muscle, the uterine cavity and the episiotomy (perineal) wound but not in the lung.

2. The spreading of the Streptococcus Group A bacteria probably occurred through the bloodstream.

3. Blistering of the right lower limb and erythema (redness of the skin) consistent with the presence of necrotic fasciitis. Sepsis is a general term to indicate not just a necrotising fasciitis but also

damage to the muscle of the thigh and the extension of the infection into the blood stream and the consequences of that.

4. Necrotising fasciitis, strictly speaking, concerns an infection involving particular planes between the muscles and other soft tissues. At the very least this had occurred in this case as the infection had also involved the underlying muscle quite considerably. Therefore, what was involved here was a more severe form of sepsis.

5. Microscopic examination showed inflammation and necrosis within the right thigh muscle in keeping with necrotic fasciitis.

6. An open wound over the perineum in keeping with the breakdown of an epistiotomy[7] site. No associated abscess formation was identified.

7. Microscopic changes in the liver, kidney and spleen in keeping with overwhelming bloodstream infection, lung congestion and changes of inhalation of material into lungs.

8. The cause of death was multiple organ failure as a result of overwhelming Streptococcus pyogenes Group A infection. It was unclear what was the source of the infection; it was more likely that the infection was related to the recent pregnancy.

9. The condition directly leading to death was sepsis (Streptococcus pyogenes (group A)."

Dr Peter Markey

102. Dr Peter Markey, Head of Disease Surveillance, Centre for Disease Control of the Northern Territory Department of Health, gave evidence. He said that Group A streptococcus is primarily a bacteria that is associated with humans. In rare circumstances it can be found in the environment. It is carried without symptoms by a small percentage of people in the community and is transmitted to other people usually through person to person contact. Large droplets of coughing could also transfer it. In this case, shortly after this matter arose, tests were conducted for it in Gove Hospital in respect of

[7] An episiotomy is a cut or tear that occurs in the process of delivery of a child.

patients and staff. A very small sample[8] of it was found on Mr Hampel, Ms Hampel's husband. However, it was made clear through other evidence (from Professor Baird) that because of the small quantity of this GAS compared to the much more substantial quantities found on the deceased that there is no possibility that Mr Hampel passed on the GAS to his wife; rather, it would have been the other way around. The other patients and staff tested for GAS returned negative results for its presence. In the subsequent weeks there was no further cases of GAS identified in the Gove Hospital.

Professor Robert Baird

103. Professor Baird is the Director of Pathology and Microbiology at Royal Darwin Hospital. He is a microbiologist, a practising infectious diseases physician and a member of the Royal College of Pathologists Microbiology Advisory Committee and a Fellow of the Royal Australasian College of Physicians (Infectious Diseases).

104. Professor Baird said that GAS is capable of causing overwhelming sepsis within a short period of time. GAS, he said, is found only on humans, not on animals, nor in the environment. GAS is carried on the skin, throat and perineum as colonising bacteria in between 5% to 20% of humans. It is overwhelming sepsis, which may or may not be associated with necrotising fasciitis, which is the streptococcal associated disease with the highest morbidity and mortality. It is not clear despite a great deal of research on the subject why GAS can suddenly turn lethal upon its human carrier. Necrotising fasciitis is a sub-set of GAS, although necrotising fasciitis can be caused by other bacteria in addition to GAS.

105. Professor Baird stated that he was not aware of any Northern Territory GAS Maternal Sepsis Guidelines in existence at the time of Ms Hampel's death. However, he was aware of the NSW Maternal Sepsis guidelines and referred to them in his statement. Those features were as follows:

[8] On his finger and leg.

- Fever of more than 38 degrees Celsius
- Tender, sub-involuted uterus
- Chills and general malaise
- Lower abdominal pain
- Diarrhoea
- Purulent and foul-smelling lochia (vagina discharge after delivery)
- Vaginal bleeding

106. None of these features were present in this case. It was therefore an atypical presentation of maternal sepsis. Professor Baird commented that Ms Hampel had an infection in her perineal wound, however it did not appear to be severe. The absence of a fever and the pain located in the leg, in particular, made it an unusual presentation of post-partum GAS sepsis, which usually has a uterine and perineal primary focus. Professor Baird noted that sepsis can occur in the absence of fever.

107. Professor Baird referred to the Early Recognition of Sepsis in adults protocol that was created for Royal Darwin Hospital in July 2012, that is after Ms Hampel's death. I shall specify the contents here in tabular form for ease of reference:

"AIM : ANTIBIOTICS IN UNDER 60 MINUTES

STAGE[9] 1: TRIAGE. DOES YOUR PATIENT HAVE RISK FACTORS? • Immunocompromised, chronic illness or elderly • Recent surgery, invasive procedure, or indwelling medical device • History of fever/rigors	

[99] I have added the words "Stage" 1,2 and 3 to make their meaning clear.

• Signs or symptoms of infection: -skin-cellulilitis, infected wound -urine- dysuria, frequency, odour -abdomen peritonism -chest- cough, shortness of breath -neuro-altered conscious state, neck stiffness or headache	
STAGE 2: TWO OR MORE YELLOW CRITERIA ON INITIAL ASSESSMENT • Respirations less than or equal to10 or greater than or equal to 25 breaths per minute • Saturations less than 95% • Systolic BP less than 100mmHg • HR less than/equal to 50 or greater than or equal to 120 per minute • Altered LOC or change in cognition • Temp less than/equal to 35.5 or greater than or equal to 38.5	If NO to the yellow box, monitor, sepsis may still be of concern.
IF YES, GO TO STAGE 3: DOES YOUR PATIENT HAVE ANY RED CRITERIA? • Lactate greater than/equal to 4 mmol/L • Base Excess less than -5.0 • SBP less than/equal to 90mmHg • Immunocompromised/age greater than 65. Note: Notify Team leader, Triage to ATS 2, Perform VBG	If NO to the red criteria the patient may have sepsis • Inform doctor in charge • Iv access and start IVF • Investigate for source(blood culture x 2, urine MCS, CXR, melioid swabs) • Baseline bloods (FBC, UEC,LFT,coags)
If YES, THE PATIENT HAS SEVERE SEPSIS UNTIL PROVEN OTHERWISE • Inform doctor in charge • Transfer to a resus for management	

108. There was no Early Recognition of Sepsis protocol in existence at Gove or at Royal Darwin Hospital at the time of Ms Hampel's death on 14 October 2011.The RDH sepsis protocol referred to above specifies a three stage procedure, which can be summarised as follows:

- Stage 1. Triage. Does the patient have risk factors, that included, relevantly, any recent surgery or invasive procedure or an infected wound?

- Stage 2: If so, does the patient have two criteria, that included, relevantly, respirations greater than 25 per minute, Heart rate greater than 120bpm or blood pressure less than 100mmHg (systolic)

- Stage 3: If so, does the patient have any red criteria, that include, relevantly, lactate greater than 4mmol/L or Base Excess less than 5.0?

- If so the patient is presumed to have Severe Sepsis unless proven otherwise.

109. Professor Baird stated that the guidelines, whilst accurate, would not allow early recognition of sepsis on the morning of 14 October 2011. This is because the combination of two clinical signs that satisfied stage 2 above did not occur in the morning (according to the observations chart). I note that at 8.40am for example, the respiratory rate was 26 breaths per minute but the heart rate was 106 and the systolic blood pressure above 100mmHg. At no point in the morning did the observation chart reveal the combination of two criteria at the same time, such as to satisfy the RDH sepsis protocol.

110. Professor Baird noted that when she presented at 6.00am Ms Hampel was exhibiting none of the classic signs of severe sepsis other than an elevated pulse rate. She was, nevertheless in the early stages of severe sepsis. Four other key factors were strongly indicative of severe sepsis. They were:

- The gross elevated CRP level

- Severe pain out of proportion to the clinical findings
- Low platelets
- Low white cell count

111. However, other than the severe pain, all of these matters were dependant upon blood results, which took some time to be obtained. Professor Baird emphasised that with severe sepsis time is of the essence and it was paramount that importance be placed upon clinical findings in order to effect an early recognition of sepsis. It was for this reason that a high CRP was not listed in the diagnostic criteria specified in the RDH Early Recognition of Sepsis protocol (dated July 2012).

112. Professor Baird said that by 12.00pm – 2.00pm key relevant data had been obtained, which showed clearly that Ms Hampel had severe sepsis. She was tachycardic (high heart rate), tachypneoic (rapidly breathing), had an extremely high CRP, a lactate of 3.8, Base excess of -3.9, falling white cells and platelets. In other words she would have ticked all relevant boxes of the RDH Sepsis protocol criteria dated July 2012, which meant that she had severe sepsis unless proven otherwise. Professor Baird said that Ms Hampel should then have been given antibiotics and then transported to Darwin for surgery.

113. Even if she had have been administered antibiotics by midday and then placed on an aircraft to Darwin at or about that time, Professor Baird opined that Ms Hampel's chances of survival would have been 30 to 50% and would have involved disabling surgery. That surgery could have included removal of her right leg and full hindquarters removal.

114. As a consequence of the death of Ms Hampel, Professor Baird was subsequently involved in a process whereby a revised Early Recognition of Sepsis Protocol was produced for Gove Hospital. A copy of it is attached as attachment six to Mr Gilchrist's statement. It replicated much of the RDH

July 2012 Protocol that Professor Baird previously referred to and which was attached to his statement. CRP now was mentioned for the first time in the Gove Protocol, albeit in the bottom of the right hand corner. It was located here and not in the primary recognition category as Professor Baird emphasised that early recognition of sepsis should focus upon clinical observations in the first instance, which ought to be carried out quickly. CRP, of course, would require a blood test.

115. There were further amendments to the RDH Sepsis protocol, which were specified in the Gove Sepsis protocol. They were as follows:

- "Insertion of " Call Careflight for Early Retrieval" once severe sepsis is presumed.
- Insertion of the importance of early transfer, with particular reference to necrotising fasciitis. Specifically, the following was inserted: "Early transfer is necessary for any patient with a suspected 'surgical source' eg cholangitis, renal abscess and other abdominal sources, skin abscess, necrotising fasciitis, septic joints."
- Even if stage 3 is not satisfied, the box in the bottom right hand corner was amended to state that the person may have severe sepsis as opposed to sepsis.
- The box in the bottom right hand corner was amended to include "contact ED consultant at RDH via access line".
- The box in the bottom right hand corner was amended to include "On review still consider sepsis, go to initial management of severe sepsis guideline".
- Stage 2 was amended to lower the Heart rate from 120 under the old protocol to 110 under the new protocol.

- Stage 2 was amended to lower the maximum temperature limit from 38.5 to 38 degrees C.

- Under Stage 2, "Perform a venous gas" was added.

- In the box marked "This patient has severe sepsis until proven otherwise" the following was added: "Go to Initial Management of Severe Sepsis in Adults Guideline."

116. Professor Baird said that "we have set the bar relatively low" in amending the protocol such that Careflight would be called in. However, he thought this necessary. He added that as a pathologist he would have liked to have seen greater emphasis placed upon the CRP count and white cell count in the protocol but was prepared to defer to his emergency department colleagues as regards the reference to these matters in the revised protocol.

Dr James Fordyce

117. Dr Fordyce was the Director of Emergency Medicine Training for Royal Darwin Hospital and the acting Director of Emergency Medicine at Royal Darwin Hospital. He reviewed the case. He acknowledged that a critical problem in this case was the issue of Dr Gardiner seeking advice from Dr Riddell. Dr Fordyce said that there was two issues here, which were:

    i) The interpretation of the information received by Dr Riddell, and

    ii) The question as whether the Registrar, a junior doctor, had the experience to ask further questions.

118. Dr Fordyce acknowledged that there was a difference between what Dr Gardiner said on the one hand and what Dr Riddell said on the other as to the conversations between them.

119. Dr Fordyce said that it was preferable that a doctor in the position of Dr Gardiner speak to the consultant directly. He added that there was an access

line in existence as at 14 October 2011, which would enable a consultant to be rung up directly. Dr Fordyce was of the view that the onus would be on the person seeking the advice to make notes of the advice that was given.

120. Dr Fordyce agreed that if the revised Sepsis recognition protocol had have been in existence at the time of Ms Hampel's death, severe sepsis would have been the presumptive diagnosis. He noted that the retrieval category was not mentioned in the protocol. Dr Fordyce agreed that a P1 category would have been appropriate. He also noted that the initial categorisation of P3, was reflective of the failure of there to have been a diagnosis of severe sepsis at that point.

121. Dr Fordyce discussed the efficacy of other diagnostic devices to diagnose necrotising fasciitis: specifically CT (computed tomography) scans, ultrasound devices and MRI (magnetic resonance imaging) scans. He said that an ultrasound would be a poor study that might show signs of inflammation, but which would not prove or disprove it. A CT scan would be likely to show changes consistent with necrotising fasciitis. An MRI scan would demonstrate it. However, Dr Fordyce said that his preference would be to go to the operating theatre to confirm it. Gove Hospital did not have a MRI device nor a CT device. Dr Fordyce said that instead of utilising these very expensive and comparatively rare devices the simple way to recognise sepsis was based on a very simple test (in combination with the recognition of diagnostic criteria), which was the blood gas test that dealt with the Base Excess and Lactate levels (amongst other things), which was the third and final stage of the sepsis protocol now in existence at Gove Hospital.

122. Dr Fordyce was of the view that it was possible that Dr Riddell and Dr Gray did not appreciate that clinical conditions of Ms Hampel at the time that they were involved in the matter. He added that the diagnosis of Ms Hampel's severe sepsis and necrotising fasciitis was delayed in part because of the clinical presentations and possibly in part because of limitations of

information transferred between Dr Gardiner, Dr Riddell and Dr Gray. This in turn led to delays in antibiotic administration and retrieval tasking. The administration of antibiotics early would have increased her chances of survival. The antibiotics would act to kill the specific bacteria. However, because sepsis is not just the effect of the infection but is the effect of the body trying to fight infection, once well established, there is a whole cascade of things going on in the body which are dangerous to the body in themselves. Antibiotics would give her a temporary fighting chance of survival but nothing more.

123. Dr Fordyce said that very severe pain is typical of necrotising fasciitis. He also added that the usual expectation in a sepsis case, is to find a fever, a high white cell count and an obvious site of an infection. He qualified this by noting that low white cell counts are frequently found in sepsis and severe sepsis cases as well but appeared to say that typically this is not what is first encountered.

Mr Doug Gilchrist

124. Mr Gilchrist is the General Manager and Director of Nursing at Gove District Hospital.

125. Mr Gilchrist said that the current early recognition of Sepsis protocol that is in existence at Gove, was designed in consultation with numerous doctors including Professor Baird, Dr Fordyce and Dr Brownlea. It was not in existence at the time of Ms Hampel's death; indeed it amended the RDH Early recognition of Sepsis protocol that was created in July 2012.

126. A critical incident review was established as a consequence of Ms Hampel's death. It specified a series of recommendations. The actions taken by Gove District Hospital in response to the recommendations arising from the critical incident review are specified in the CIR action plan that is specified in Attachment B to Mr Gilchrist's statement. A range of matters have been identified. They are as follows:

"(i) Early recognition of sepsis protocol

(ii) Improved technology to support good communication. Specifically, a digital outreach coordinator was appointed in June 2012 to assist in accessing digital camera technology.

(iii) Improvement to MEWS (modified early warning scoring system) to prompt early recognition of a deteriorating patient

(iv) Better communication with consultants

(v) A new model of Careflight Retrieval services

(vi) Improved Infection management

(vii) Improvements regarding Education for new mothers"

127. The panel recommended numerous improvements and changes. The most important can be summarised as follows:

"(i) Unless clearly requiring a sub-specialist, all calls for a consultant should go to the Emergency Dept dedicated access line.

(ii) It was noted that the original CRP result was not issued at the time it was received; rather it was subjected to a further test. The treating doctor was not advised of this. She should have been advised that the test was being re-run because of the high initial result so as to give early warning to a probably significantly abnormal test.

(iii) No written document of the advice given by RDH was recorded. It was recommended that such advice always be documented, thereby becoming part of the patient's records

(iv) The scanned copy of all MEWS and pathology results were not provided in full. They should have been.

(v) Teleconferencing, which was then in existence at Gove, could have been used.

(vi) Full training in use and interpretation of MEWS to be developed. In particular the MEWS score must include the urine output, must be specified in full and kept updated and relevant consultation with senior medical staff effected if the score is high. This is particularly so if it remains high. A Fluid balance sheet must be kept if the score is 4 or above. Also, if the score is consistently 4 or above, the RDH access line must be called for consultant level advice and blood gas must be taken. There was also a lowering of threshholds as regards MEWS criteria; training and auditing have been introduced in this area. MEWS was designed to assist nursing staff however, clearly to be utilised by doctors.

(vii) The P3 initial retrieval categorisation was inadequate. Greater consultation and observation of MEWS criteria required to ensure proper categorisation.

(viii) Electronic transfer tasking sheets to be accessed by Gove District medical officers."

128. Mr Gilchrist noted that the Gove Sepsis protocol varied from the RDH sepsis protocol in a number of ways, which included lowering the heart rate from 120 to 110 and lowering the temperature from 38.5 to 38.0.

129. Mr Gilchrist added that the infection control processes at Gove were checked and audited and they passed the stringent tests applied to them.

Mr Chas Nokes

130. Mr Nokes, the father of Ms Hampel addressed me at the conclusion of the evidence. At the outset, he said that at the time of his daughter's death the system lacked some teeth in order to deal with the situation. Secondly, he said that he and Mr Hampel had the utmost respect for the input from Gove

Hospital, in particular from the doctors and nurses, which commenced on day one. Thirdly, he said that at the time the Gove doctors were challenged by the procedures then in place to get the required responses from Darwin. He said that he thought that the critical period was probably 10.00am to 1.00pm, after 1.00pm his daughter's life was probably lost. He agreed with me in my remarks to him that one o'clock was perhaps the critical time. Mr Nokes stated that a great deal of work had been put into remedying the situation since his daughter's death had occurred. Mr Nokes sought that the procedures that have been introduced into Gove be introduced into all rural hospitals in the Northern Territory and if possible, Australia wide.

FINDINGS

131. It is readily apparent that the effect of the necrotising fasciitis that rapidly overwhelmed Ms Hampel was utterly lethal. It killed her within 18 hours of her presenting at Gove Hospital.

132. When Ms Hampel arrived at Gove Hospital at 6 o'clock on the morning of 14 October, 2011 three things needed to happen if she were to survive. Firstly, a diagnosis of sepsis or at least a presumptive diagnosis of sepsis needed to occur promptly. Secondly, she needed to be administered antibiotics as a matter of urgency for the purpose of killing, or at least endeavouring to kill, as much of the Group A Streptoccoccus that was the cause of the problem, as possible. Thirdly, she needed to be transferred to Darwin as a matter of the utmost priority in order that surgeons could operate upon her with the object of removing the necrotising fasciitis and associated damaged tissue. This three-fold path was Ms Hampel's only route to survival.

133. I accept that in the absence of an Intensive Care Unit (ICU) at Gove that it was impossible for that reason alone, for surgery to take place there. It was clear that the sort of surgery that was required in Ms Hampel's case was predicated upon the presence of an ICU and a skilled surgical team.

134. What killed Ms Hampel was maternal sepsis (post puerperal sepsis) that arose, probably, as a consequence of her giving birth 8 days prior to this incident. I accept the evidence of Dr Botterill who said that the likely source of the infection was associated with the recent birth of her child and by this I take him to mean not merely the sutured site in the perineum of Ms Hampel but also the entire uterus as a consequence of the natural process of the delivery of a child. As Dr Botterill said, we, in Australia, forget how dangerous child birth is in the real world. The infection that then occurred was effected through the GAS bacteria. How it got there is not clear. I shall refer to this later in my findings. In terms of why the right leg was affected Dr Botterill raised the possibility that this had occurred as a consequence of the infection spreading through the bloodstream and then going to the leg. Professor Baird stated that a little pool of blood in muscle is a perfect culture media for bacteria and raised the possibility that the knock that Ms Hampel had recently sustained to the right leg might have permitted the GAS bacteria to settle in that leg and multiply. Whilst no concluded view was expressed by the experts in this regard, it would seem to me to be a plausible theory to explain the presence of necrotising fasciitis in the right leg and the extreme pain that this caused.

135. I accept the evidence of Professor Baird who said that even if Ms Hampel were to have been transferred in the morning to Darwin her chances of survival would have been 30% to 50%, such was the lethal and devastating quality of the perfidious infection that was attacking her.

136. I find that the critical time to save Ms Hampel's life was in the morning of 14 October 2011. Whilst it cannot be stated with absolute precision, it would seem to me that preferably well before and at least by 1.00pm Ms Hampel needed to be on an aircraft bound for Darwin, having already been administered antibiotics. After this time, it was probably too late. This is despite the skill and tenacity of Dr Brook, in particular, who was the first of the doctors to recognise that sepsis and, in particular, necrotising fasciitis

was the cause of Ms Hampel's problems. In commending Dr Brook in this regard I do not mean to derogate from the efforts of Dr Dwyer and Dr Gardiner, who did their very best to save Ms Hampel's life.

137. A key problem for Dr Gardiner was that at the time that this death occurred, there was no Early Recognition of Sepsis protocol (of the sort that I have seen presented in this Inquest) in place in Gove Hospital or in Royal Darwin Hospital. The current Royal Darwin Hospital protocol was only put in place in July of 2012. The Gove protocol, which modifies the Darwin one in some respects was put in place after that. There was no maternal sepsis protocol in place of the sort that Professor Baird referred to, which he had obtained from NSW. This meant that at the time that this problem arose Dr Gardiner had no early recognition of sepsis protocol to guide her as to the correct diagnosis of Ms Hampel. It would appear that Dr Gardiner did not speak with any Gove colleagues in any depth about the matter because they were all so busy. Therefore, all Dr Gardiner could do at that time was to call Royal Darwin Hospital.

138. In relation to what then happened as regards Dr Gardiner's telephone conversations with Dr Anna Riddell, I preface my findings by stating now that I accept Dr Gardiner's evidence in its entirety. She was utterly frank with this Inquest. She readily accepted that she was out of her depth, that she was eventually in a position where she was at her wit's end and, moreover, that she was forced at one point to google "necrotising fasciitis". Further, she frankly admitted that she made a mistake in not keeping observations of Ms Hampel's urine output and that the initial prioritisation of Ms Hampel as a Careflight patient as P3 was too low and should have been higher. She was a obstetrician of 30 years' experience. The candour of her evidence, her long experience, the detail of her recall combined with her professional demeanour was such that, in my veiw Dr Gardiner was a truthful and reliable witness whose evidence I can rely upon.

139. Dr Gardiner needed help quickly and she sought it by trying to telephone a consultant at Royal Darwin Hospital. This she was unable to do despite her best efforts. It was then that she was put through to Dr Anna Riddell. This was most regrettable as Dr Riddell was a junior doctor and a senior doctor of first rate relevant expertise was needed at this point.

140. The differences between the conversations that occurred between Dr Gardiner and Dr Riddell can be specified in a tabular format as follows:

Issue	Dr Riddell	Dr Gardiner
Time of first call	8-8.30am	Approx. 11.30am
Time of the second occasion that Dr Gardiner phoned	12.30pm	Approx. 2pm
Whether Dr Riddell said that Ms Hampel could be transferred to Darwin?	Yes. This occurred after Dr Gardiner called Dr Riddell back at about 12.30pm	No. This never occurred. Dr Gardiner made the decision of her own volition at about 3pm
Whether Dr Riddell said that antibiotics were to be administered	No. Dr Riddell said that she did not consider antibiotics as Dr Gardiner said that Ms Hampel did not look unwell and was stable	No. Dr Gardiner said that this was ruled out by Dr Riddell in the absence of a definite diagnosis
What Dr Gardiner said regarding Ms Hampel's health	Dr Gardiner said, in the 9.30am conversation, that Ms Hampel looked well although she was tachycardic. In the alleged 12.30pm conversation, Dr Gardiner said that Ms Hampel didn't look unwell.	Dr Gardiner said to Dr Riddell that Ms Hampel was extremely distressed, amongst other things and did not say that she looked well. Nor did she say that Ms Hampel didn't look unwell.

141. The differences between the doctors are substantial, particularly in regard to the critical issues of the transfer of Ms Hampel, the timing of the calls and the reasons why no antibiotics were to be employed. I have already noted that Dr Riddell threw away her notes and hence made her statement on a

date that she cannot remember, from memory. Furthermore, certain parts of her evidence are of real concern, to say the least. For example, as at 8.00am to 8.30am the clear evidence is that the blood results had not even been released at this point (they were released at about 9.30am) yet Dr Riddell said in this first conversation with Dr Gardiner that she discussed blood results. Secondly, Dr Riddell said that she made the decision to transfer Ms Hampel in a phone call received from Dr Gardiner at about 12.30pm. I pause to note that the difference with Dr Gardiner's evidence is starkly apparent as Dr Gardiner says that it was some two and a half hours later and that Dr Gardiner made the decision alone, almost, it would appear, in desperation. The two versions of course cannot be reconciled. Dr Riddell spoke about there being a plan put in place in this 12.30pm conversation. Dr Gardiner says there was no such plan. As to why the necessity to transfer Ms Hampel -from what Dr Riddell said it is entirely unclear. It seems to derive from a vague view that things "did not add up" as she put it. A final matter is that Dr Riddell speaks of the CRP results being available in the alleged 12.30pm conversation as well as deteriorating blood results. The evidence of Dr Gardiner was that the second blood samples were only collected at about 12.20pm and the results released at about 1.00pm to 1.30pm The CRP results were divulged for the first time, it would appear, at the time of the results of the second blood tests.

142. In summary, regarding Dr Riddell, I do not accept her evidence that:

"(i) In a phone conversation between her and Dr Gardiner that she alleges took place at 12.30pm she agreed with Dr Gardiner and said that Ms Hampel was to be transferred to Darwin.

(ii) In the alleged 12.30pm conversation between her and Dr Gardiner that Dr Riddell said that there was a plan to transfer Ms Hampel to Darwin.

(iii) That the first phone call between Dr Gardiner and herself was at 8.00am - 8.30am

(iv) That the second time that Dr Gardiner phoned was at 12.30pm.

(v) That Dr Gardiner said to her that Ms Hampel looked well (or that she did not look unwell)."

143. I am uncertain as to why Dr Riddell delivered evidence in the way that she did in relation to the important matters that I have referred to above. It may be that this was a process of reconstruction that was in part affected by the absence of notes and the passage of time. I note that in her evidence she initially seemed to say that the decision to transfer Ms Hampel to Darwin was made by her at about 9.30am, then she appeared to change tact and settle on a call that she alleged took place at 12.30pm as being the time when she allegedly agreed that Ms Hampel be transferred to Darwin. It is of further concern that Dr Riddell said that she contacted Dr Gray after the third call, that is the alleged 12.30pm call, and not before. I would have thought it prudent that after receiving the first call from Dr Gardiner that this would have prompted Dr Riddell to contact Dr Gray as soon as possible.

144. I have further concerns about Dr Riddell's evidence. The first of these concerns derives from a question asked by Counsel Assisting of Dr Riddell, which was whether the combination of a low white blood cell count, a very high CRP, a very high heart rate and a high respiratory rate indicated sepsis. Dr Riddell responded that she wasn't aware of the high respiratory rate but in any event the presence of these factors would not necessarily indicate sepsis. Dr Riddell mentioned that it could have something to do with the recent pregnancy. In saying this she appeared to be suggesting that the pregnancy might have been a matter unconnected with sepsis, whereas the reality was, as Professor Baird said, that this matter was an atypical presentation of GAS maternal sepsis. Furthermore, as Professor Baird said, the list of the criteria specified above is strongly suggestive of the presence of sepsis. Dr Riddell's evidence is of very real concern given that it was delivered nearly two years after the death of Ms Hampel and the subsequent educative efforts embarked upon by the Northern Territory Department of Health in the wake of Ms Hampel's death. Whilst I appreciate that Dr

Riddell is no longer operating as a doctor in the Northern Territory health system but rather practising as a doctor in Britain, it is rather troubling to say the least that she delivered this evidence, given that it flies in the face of what would be appear to be the uncontroverted medical opinion that was delivered by Professor Baird. It is all the more remarkable that Dr Riddell gave this evidence, given that she said that she was very familiar with sepsis having dealt with it previously on some 50-100 occasions. Clearly, she had learnt little from this experience.

145. It is also of concern that the question of necrotising fasciitis was raised in the penultimate conversation between Dr Gardiner and Dr Riddell in an off handed way, as described by Dr Gardiner, (which I accept occurred), and that Dr Riddell supplied some rough diagnostic guidelines as to what to look for. The reality was that necrotising fasciitis could not be proved at this point other than through surgery and that the fundamental matter to attend to was the diagnosis of sepsis, which was being caused by the necrotising fasciitis. As Dr Riddell clearly did not know what to look for in this regard, that is the three step process that is specified in the sepsis protocols that now exist, nothing of assistance emerged from her in terms of genuine assistance to Dr Gardiner.

146. In making these comments about Dr Riddell I am conscious that she was a junior doctor. She should not have been placed in the position that she was in and once placed in it should have delivered the entire matter to Dr Gray who should have spoken directly to Dr Gardiner. Dr Riddell, I should add, was clearly and crucially hampered by the absence of the sepsis recognition protocol at that point, which if it had existed, would have triggered sepsis recognition, albeit at different times depending on which protocol was employed. This is because on careful inspection of the two protocols that subsequently came into existence the Gove protocol specifies a heart rate of 110 and above at Stage 2. The RDH protocol specifies at the same location 120. Two criteria at Stage 2 are required to be satisfied simultaneously. The

observations chart records indicate that under the Gove protocol, if it had existed at the time, Ms Hampel would not have satisfied Stage 2 until 10.00am (with the combination of a HR of 116 and systolic BP of less than 100mmHg). However, under the RDH protocol she would not satisfy Stage 2 until 1.00pm. I shall return to this in my recommendations.

147. There is one further matter in respect of the current sepsis protocols and that concerns what has been referred to as the blood gas data at what I have referred to as stage 3 (Base Excess, lactate etc). It is has been made clear by doctors such as Dr Fordyce that blood gas results can be obtained quickly, by inference more quickly than standard blood results. However, I do note that the blood gas results don't appear on the clinical records in the morning of 14 October. I presume that this is an oversight.

148. Dr Gray gave evidence in this Inquest. She had made a statement very late, just prior to the inquest, and was reliant, in making that statement, primarily upon her memory as she had made no notes, contemporaneous or otherwise, of the conversations that she had with Dr Riddell. She did however have Dr Riddell's statement when she made her statement. This was regrettable as it may have influenced her when she made her statement, without reference to any other material, approximately 22 months after the events in question. Fundamentally, Dr Gray had a limited recollection of events. Of course, Dr Gardiner never spoke to Dr Gray. Dr Riddell said that she spoke to Dr Gray on one occasion in person and that was for about five to ten minutes. Neither doctor was able to specify a time or even a rough estimate as to when this conversation occurred[10] Nor was Dr Riddell clear if she spoke to Dr Gray once or twice. I note that Dr Gardiner said that Dr Riddell said to her that that she was keeping the Consultant fully informed of the matter or words to that effect. I find that whatever conversation that Dr Riddell had with Dr Gray, be it once or twice, it was very brief.

[10] It was not even known if it was morning or afternoon.

149. Dr Gray's role was extremely important. She was the infectious diseases consultant. She was the senior doctor with relevant expertise that included extensive experience with sepsis. Yet she did not ask Dr Riddell for observations data and made, it would seem, no real enquiries to determine what was wrong with Ms Hampel, let alone to seek to arrive at a reasoned attempt at a diagnosis. Furthermore, Dr Gray's evidence is at variance with Dr Gardiner's on the question of the transfer of Ms Hampel. Specifically, Dr Gray said that Dr Riddell asked her whether she would accept transfer of Ms Hampel to Darwin and she said yes. I have already referred to Dr Gardiner's evidence on this point, which I have accepted occurred. It follows that I reject Dr Gray's evidence in relation to this aspect of her evidence. It is not clear why Dr Gray arrived at this version, but it may have been a process of reconstruction, influenced, in part, by the absence of notes, the delay and the provision of Dr Riddell's statement to Dr Gray at the time that Dr Gray made her statement just prior to the Inquest.

150. In fairness to Dr Gray, I must take note of the following matter. Firstly, the clear evidence of Dr Gardiner is that she made it abundantly clear to Dr Riddell that Ms Hampel was not well. I have no doubt that Dr Gardiner did so and made the position clear. Secondly, Dr Gray denied that she had received a substantial amount of information that suggested strongly that Ms Hampel was sick. On the contrary, Dr Gray said that Dr Riddell told her that Ms Hampel was well and afebrile. Thirdly, Dr Riddell gave evidence that Dr Gardiner told her (in the conversation that she alleged took place at 9.30am) that Ms Hampel was looking well although she was tachycardic. Dr Riddell added that in the conversation that she alleged took place at 12.30pm Dr Gardiner told her that that Ms Hampel didn't look unwell. Given that both Dr Riddell and Dr Gray say in effect that that Dr Riddell told Dr Gray that Ms Hampel was well (apart from tachycardia) I find that it probably was the case that Dr Riddell did indeed say to Dr Gray that Ms Hampel was in effect well (apart from the tachycardia).

151. This is a fundamental error, which obviously would have reduced the pressing urgency of the matter in the mind of Dr Gray. How Dr Riddell could have made this error is remarkable. I have wondered if there has been a failure of Dr Riddell's memory causing her to engage in a process of reconstruction. Again, the absence of contemporaneous notes or indeed any notes does not assist the delivery of accurate and hence, reliable evidence.

152. I also appreciate that Dr Gray was extremely busy, receiving multiple phone calls, running a clinic and dealing with a patient load. Further, the conversation or conversations (between Dr Gray and Dr Riddell), was or were very short. I suspect that it was highly unlikely that the context in which this brief conversation/s occurred facilitated quiet, reasoned analysis.

153. However, the critical point still remained that Ms Hampel was critically ill, time was of the essence, and a very short conversation of possibly five to ten minutes was nowhere near good enough to deal with the heart of the matter, which demanded professional assistance of the highest calibre In order to resolve the problem expeditiously. This assistance was not forthcoming. This was particularly regrettable given that Dr Gray had extensive prior experience of necrotising fasciitis unlike every other doctor who gave evidence in this Inquest. Of course, for the reasons already referred to, Dr Gray did not have a sepsis recognition protocol to refer to, but given her extensive prior experience she should have known what to look for notwithstanding the atypical nature of Ms Hampel's presentation. Yet, she herself admits that she didn't even consider necrotising fasciitis.

154. In summary, regarding this aspect of the evidence, at this critical juncture, with a young woman's life hanging in the balance we have the following scenario:

- a consultant who was not properly advised of Ms Hampel's desperate situation

- a consultant misled as to a critical detail of Ms Hampel's health
- a consultant not supplied with key data such as observation charts (which the consultant didn't request)
- a meeting or meetings between consultant and registrar that may have lasted a mere five to ten minutes,
- a meeting, which was not aimed at the consultant delivering a diagnosis of the problem.
- a meeting, which it was claimed by those involved to be mostly about getting approval for transferring Ms Hampel to Darwin, which is implicitly contradicted by the evidence of Dr Gardiner. (As I have accepted Dr Gardiner's evidence on this point I do not accept what is claimed by Dr Riddell and Dr Gray in this regard.)

155. Overshadowing this unfortunate state of affairs, is the regrettable spectacle of doctors giving, in respect to important matters, utterly different versions of events, with a complete absence of any contemporaneous notes of their conversations to back them up, causing an element of confusion to be introduced into the matter as to who said what to whom. This occurred at a time when professional, reasoned and rapid analysis should have been the dominant paradigm. It is only the impeccable nature of Dr Gardiner's evidence that enables me to deliver an element of clarity to this aspect of the Inquest.

156. I shall now turn to a matter that Professor Baird noted, which was that this was an atypical presentation of maternal sepsis because of, inter alia, the absence of a fever (until very late in the day) and the presence of pain in the right leg as opposed to the uterine/perineal area. I find that it was indeed an atypical presentation of maternal sepsis. However, there were many other features consistent with sepsis, which have been referred to above, and which were specified by Professor Baird. The fact that this was a somewhat

atypical presentation of maternal sepsis ought not to have constituted any real difficulty in arriving at the correct diagnosis; on the contrary with a properly formulated sepsis protocol of the sort that has since been produced for Gove Hospital, Ms Hampel would have satisfied that criteria at the least at 10am (provided that the blood gas results were available at that time). In my view this criteria should have been satisfied earlier, and I will refer to this in my recommendations.

157. It was of course highly regrettable that Gove Hospital and indeed Royal Darwin did not have sepsis early recognition protocols in place on 14 October, 2011. Despite the very significant efforts of Gove and Royal Darwin Hospital since then to remedy the situation, the Department of Health must bear some considerable responsibility for this failure at the time of Ms Hampel's death.

158. I have no criticism to make of Careflight and the delay in getting the relevant aircraft to Gove. The delays were unavoidable in the circumstances. Once the aircraft arrived at 7.48pm the delay that occurred for the next few hours had nothing to do with Careflight but instead was due to the necessity of stabilising Ms Hampel who very nearly died at about 7.45pm to 8.15pm. I note that Careflight, subsequent to this matter, changed its procedures in relation to the priority categorisation of patients.I shall refer to that in my recommendations.

159. Clearly though, Ms Hampel should have had a P1 priority categorisation from the outset. Dr Gardiner agreed that it should have been higher than the initial P3 categorisation[11]. In any event, even if a P1 categorisation had have been specified, by the time that aircraft was called for at 3.26pm it was too late.

[11] Dr Gardiner stated that she could not recall if she was involved in the priority categorisation decision.

160. As to the question of the source of the GAS the evidence is that the hospital itself was complying with appropriate cleaning and hygiene standards. Dr Markey's team who conducted tests for GAS revealed that it was found in nobody else other than Ms Hampel's husband. I should emphasise again that he should not feel in way responsible as the uncontroverted medical opinion is that, given the disparity between the quantities upon each of them, he could not have transferred the GAS to his wife; it must have been the other way around. I find that there is no evidence to suggest that Gove Hospital, either through its staff or patients was responsible for the GAS that killed Ms Hampel.

161. Regarding the nature of the GAS I accept the evidence of the specialists that GAS is found in humans and not animals and that a small percentage of people (that may be up to 15% of the population, depending upon location) carry it at any one time without symptoms. GAS would also appear to not exist in the built environment other than in rare circumstances.[12]

162. Finally, I was particularly impressed by both Mr Nokes and his son-in law, Mr Hampel at the fundamental courtesy and courage that they displayed during this Inquest, which must have been heartrending to both of them. Both men, jointly, have provided constructive criticism regarding how things could be learnt from this tragedy so as to endeavour to ensure that a death of this kind does not happen again. I was particularly pleased to hear that the extended family remains together and that the little child of Mr and Ms Hampel is growing up in a warm environment despite the tragic loss of her mother.

[12] In terms of it surviving in the built environment Professor Baird said in his statement that this cannot occur; Dr Markey said that in rare circumstances it can be found in the environment. I presume that in the latter case it cannot survive for very long.

FORMAL FINDINGS

163. Pursuant to section 34 of the *Act*, I find, as a result of evidence adduced at the public inquest, as follows:

(i) The identity of the deceased in this case was Sara Lorraine Hampel, born on 12 November, 1989 in Loxton, South Australia. Ms Hampel resided at 3 Dryandra Close, Nhulunbuy.

(ii) The time and place of death was 11.45pm on 14 October, 2011 on board Careflight aircraft VH 2LY which was on the tarmac preparing for take off at Nhulunbuy airport.

(iii) The cause of death was multiple organ failure as a result of . overwhelming Streptococcus pyogenes Group A infection. The condition leading directly to death was sepsis (Streptococcus pyogenes (Group A).

(iv) Particulars required to register the death:

1. The deceased adult was Sara Hampel.

2. Sara Hampel was a surveyor on maternity leave.

3. The cause of death was reported to the Coroner.

4. The cause of death was confirmed by post mortem examination carried out by Dr Paull Botterill on 18 October 2011.

5. Ms Hampel's parents are Mr Chas Nokes and Mrs Cheryl Nokes.

RECOMMENDATIONS

164. I have listened carefully to the evidence of Mr Doug Gilchrist, the General Manager of Gove Hospital. He has clearly performed a great deal of work in

consultation with numerous specialists in remedying the problems that Ms Hampel's death reveals and has put together a most helpful dossier of materials, which was tendered in this Inquest. I commend Mr Gilchrist for all the efforts that he and the NT Health department have engaged in to endeavour to ensure that there is no repetition of this tragic case. Contained in the materials that Mr Gilchrist tendered are contained numerous findings of matters of concern, recommended action in respect of each concern and then, subsequent to that, monitoring of progress in regard to each reform. I commend each of the matters that are the subject of the critical incident review and shall refer to them shortly but before I do so I make the following recommendations.

165. I have referred previously to the sepsis recognition protocol for Gove Hospital. There is one key matter in respect of which I make a recommendation. We now know that when Ms Hampel arrived at the Gove Hospital at 6.00am she was very sick and already in the early stages of severe sepsis. Dr Luthy says that her pulse rate at shortly after 6.00am was 110 (95 when settled), her blood pressure was normal at 110/60, her temperature was 36.8. She didn't specify the respiratory rate. Therefore at this point stage two of the Gove sepsis protocol (if it existed back then) would not have been activated. The observation charts for the day commence with results taken at 8.00am. At that time the observation charts reveal that Ms Hampel had a respiratory rate of 21, a heart rate of 116 and a systolic blood pressure of 120. On the present Gove protocol, stage two would not have been satisfied as the respiratory rate requires 25 at least, and the heart rate requires 110bpm. The systolic blood pressure had to be less than 100mmHg. The Gove protocol would have been satisfied at 8am (subject to appropriate blood gas results) if the sepsis protocol respiratory rate was lowered to 20. I recommend that this occur. I note that the Mayo Clinic in the United States, which is an esteemed medical organisation of many years standing, has respiratory rate of 20 breaths per minute under its

sepsis diagnosis protocol. It would seem to me that this, of itself, is a strong basis for lowering it. Fundamentally, it would be nonsensical if a lady who we now know was in the early stages of severe sepsis does not have this recognised as soon as possible. I also recommend that the RDH sepsis protocol heart rate figure be lowered to 110 from 120 for the same reason. I can see no reason for the difference with Gove and prudence would dictate that the lower number be used. The Mayo Clinic uses a heart rate figure of 90 beats per minute.

166. The second recommendation that I make is that medical doctors when making a statement for an Inquest should make it as soon as possible; refer to clinical notes, if possible; date the statement; and not refer to the statements of any others when in the process of making the statement.

167. I shall now refer to the series of matters identified by Mr Gilchrist in his Critical Incident Review Report dated November, 2011.

> "(i) The most vital matter is the Emergency Dept access line to a critical care consultant. This was a crucial failing in Ms Hampel's case. I endorse the use of it. This is utterly vital and it must exist for all rural medical outposts in the Northern Territory. It must be monitored to ensure that this is been utilised at all times by remote hospitals and that all doctors are very familiar with how it works.
>
> (ii) I endorse the use of the Tele-health camera service to be used as a diagnostic tool by remote area medical staff. I would recommend that this be used extensively by all doctors in rural locations seeking advice from a consultant. I further recommend education of all doctors in employ of NT Health in the use of this device. If this device had have been used in Ms Hampel's case it would surely have indicated clearly to Dr Riddell that Ms Hampel was not well, in fact she was very unwell.
>
> (iii) Further, I endorse the recommendation that contemporaneous notes be made as a matter of routine practice by all rural doctors seeking the advice of consultants and those notes be immediately placed on the clinical records of the patient. This

would hopefully eliminate the confusion that occurred in this case.

(iv) I endorse the recommendation that pathology results be provided in full and not partially as occurred here. Obviously this is vital.

(v) I endorse the recommendation that if pathology services decide to re-run a test as they did in this case with regard to the CRP result that they notify the requesting doctor of this. I would go one step further and recommend that the requesting doctor be informed as soon as possible of the first result.

(vi) I endorse the recommendation that there be training of all medical staff and ongoing professional development particularly in regard to matters such as sepsis, necrotising fasciitis, and the diagnosis of such problems.

(vii) I endorse all recommendations made in respect to improvements in retrieval patient priority for the purpose of Careflight. I note the changes that have subsequently been made by Careflight in terms of their retrieval priority procedures and endorse them.

(viii) I endorse the recommendations made in respect to improvements in the MEWS system which hopefully should eliminate the oversight made in respect to urine output in this case."

168. I do not see the necessity for making any recommendation in relation to the installation of MRI or CT devices. It is clear from the evidence of Dr Fordyce that such expensive devices, that are presently not available at hospitals such as Gove, would not be necessary when the relatively simple blood gas results can be obtained quickly and easily so as to meet stage 3 of the sepsis protocol.

Dated this 20th day of November 2013.

GREG CAVANAGH
TERRITORY CORONER