Capital and Coast District Health Board

Orthopaedic Consultant, Dr B

A Report by the

Deputy Health and Disability Commissioner

(Case 16HDC01557)

Health and Disability Commissioner
Te Toihau Hauora, Hauātanga

Contents

Executive summary

1. On the night of 6 February 2015, Ms A (aged 22 years) went to the Emergency Department (ED) at a public hospital with glass in her left lower leg and a numb foot. An X-ray showed no fragments of glass in the wound, and the emergency medicine registrar noted that Ms A reported an area of numbness. The on-call orthopaedic registrar was called, and he documented a sensory loss measuring approximately 6cm in diameter on her heel.

2. The orthopaedic registrar recorded that in the morning he would discuss the case with the orthopaedic consultant surgeon on call, and would call Ms A with an update. Ms A's wound was sutured and bandaged, and she was discharged home. Ms A was advised not to eat or drink anything in case she needed an operation to repair the nerve. She was told that she would be telephoned in the morning with further instructions. The discharge summary was given to Ms A and sent to her GP. The discharge summary stated that Ms A's sutures were to be removed by her GP in 10 days' time, and that she should seek medical attention earlier if she noticed any sign of infection.

3. Ms A's case was discussed at the handover meeting in the morning, and it was decided that surgery was not required. Orthopaedic consultant surgeon Dr B was the senior medical officer (SMO) at the meeting. Ms A was telephoned and advised that surgery was not indicated, and that further care would be with her GP rather than the Orthopaedic Service.

4. Over the next three months, the wound became infected and left "a nasty scar", and the pain on the bottom of Ms A's foot was sometimes so painful that she could not stand. Her GP prescribed nortriptyline. After six months, the pain worsened, and she saw a physiotherapist and a sports medicine doctor, and was referred to an orthopaedic surgeon and then a plastic and reconstructive surgeon.

5. The plastic and reconstructive surgeon told Ms A that "the nerve should have been operated on within 48 hours as there had been serious damage to the main nerve that went through to the bottom of [her] foot and toes". On 28 October 2015, Ms A had surgical exploration and nerve grafting. She was referred for physiotherapy to strengthen the muscles in the sole of her foot and to increase the range of movement in her ankle.

Findings

6. Ms A received no reassessment or follow-up by a senior clinician on the day of her admission or at any stage afterwards. The Deputy Commissioner noted the importance of adequate support for junior staff to enable the provision of safe care to patients, and considered that there was a lack of follow-up of Ms A by a senior member of the Orthopaedic Service at Capital & Coast DHB (CCDHB). Accordingly, the Deputy Commissioner found that CCDHB breached Right 4(1) of the Code of Health and Disability Services Consumers' Rights (the Code).

7. The Deputy Commissioner was also critical that Dr B did not see the need to recall Ms A for further assessment. Ms A's wound was a deep penetrating injury with an area of numbness, and surgical exploration should have been undertaken to check for nerve damage.

Recommendations

8. The Deputy Commissioner recommended that CCDHB (a) use this report for training orthopaedic registrars; (b) emphasise, in induction and ongoing training of orthopaedic clinicians, that all penetrating injuries overlying a neurovascular structure with sensory or motor signs be assessed by an SMO regarding the need for surgical exploration; (c) consider whether its systems can be improved regarding appropriate supervision of junior registrars; and (d) provide a written apology to Ms A.

Complaint and investigation

9. The Health and Disability Commissioner (HDC) received a complaint from Ms A about the services provided to her by Capital and Coast District Health Board. The following issues were identified for investigation:

- *Whether Dr B provided Ms A with an appropriate standard of care in February 2015.*
- *Whether CCDHB provided Ms A with an appropriate standard of care in February 2015.*

10. This report is the opinion of Deputy Commissioner Rose Wall, and is made in accordance with the power delegated to her by the Commissioner.

11. The parties directly involved in the investigation were:

Ms A	Consumer/complainant
Capital and Coast DHB	Provider/DHB
Dr B	Provider/orthopaedic consultant
Dr C	Provider/junior orthopaedic registrar

12. Information from an emergency medicine registrar, Dr D, and a plastic and reconstructive surgeon, Dr E, was also reviewed.

13. Independent expert advice was obtained from Professor Jean-Claude Theis, a professor of orthopaedic surgery (**Appendix A**).

Information gathered during investigation

Background

14. On 6 February 2015, Ms A (22 years old at the time) accidentally got glass in her left leg (on the inner side, just above the ankle), and her foot went numb. An ambulance was called and she was taken to the ED. She arrived at 11.18pm, and nurses arranged for an X-ray and analgesia (pain relief).

15. At around 2am, Ms A was assessed by an emergency medicine registrar, Dr D, under local anaesthetic. Dr D described the wound as a "5cm inverted U-shaped laceration to left lower leg" localised about 10cm above the medial[1] aspect of the ankle joint. An X-ray confirmed that there were no fragments of glass in the wound. Dr D noted that Ms A reported an area of sensory numbness along the medial aspect of the ankle joint.

16. Ms A told HDC that as the clinicians started to sew up the wound, she stopped them and asked whether there was a "foot doctor around to have a look at it because it didn't feel normal". She told HDC: "I literally could not feel the bottom of my foot."

Assessment by Dr C

17. Dr D called the on-call orthopaedic registrar, Dr C, to request an assessment. Dr C said that the request was because "[Dr D] was concerned about sensory loss to the medial aspect of [Ms A's] heel".

18. Dr C assessed Ms A at around 3am on 7 February, and confirmed the size and location of the laceration, noting that he thought that the laceration was posterior to the tibia (shin bone). Dr C carried out a sensory examination of the ankle and foot, and documented a sensory loss measuring approximately 6cm in diameter over the medial aspect of the heel. He further checked for any damaged tendons or arteries, and found no evidence of either. He noted that the sensation of the rest of the ankle and foot was normal.

19. Dr D told HDC that Dr C's clinical examination was thorough, with Dr C having specifically tested for different modalities of sensory loss over the foot.

20. Dr C documented a "near absent sensation in likely distant branch of medial crural branch nerve injury region". He referred to this as being the saphenous nerve (a sensory nerve in the leg). According to Ms A, Dr C told her that "there was a little bit of damage to the nerve but that it was too small to operate on and would fix itself". Dr C's recollection, however, is that he advised Ms A that "the nerve involved was very small". He agrees that he said that it might be too small to repair, but said that he would not have told her that the nerve would heal itself, but "would have stated that this may or may not happen".

21. An orthopaedic specialist was available on call during the overnight shift, but Dr C did not consider it necessary to contact the specialist for advice.

[1] Towards the middle.

22. CCDHB said that it is the Orthopaedic Department's usual practice that all patients seen acutely by the on-call registrar are discussed with the Senior Medical Officer (SMO) and the Orthopaedic Team at handover at 7.30am the following day. The history and examination findings are reported, radiology images are reviewed, and the registrar's management plan is either confirmed or altered accordingly by the on-call orthopaedic consultant.

23. Dr C documented at the time that he would discuss the case with the orthopaedic consultant surgeon on call the next morning and, in particular, whether or not the nerve should be repaired, and would call Ms A afterwards with an update.

24. Dr D cleaned and sutured the wound, and Ms A was given paracetamol and ibuprofen. The wound was bandaged, and she was discharged home at around 4am but advised not to eat or drink anything in case it was decided the next morning to carry out an operation to repair the nerve. She was told that she would be telephoned in the morning with further instructions. Her discharge summary advised that the sutures were to be removed by her GP in 10 days' time, and also stated: "Please seek medical attention earlier if you notice any sign of infection developing — increasing pain, swelling or redness around the wound." Ms A's GP was sent a copy of the discharge summary, and a copy was provided to Ms A.

Discussion the next day between Dr C and Dr B and follow-up

25. During the night shift, a record is made when a patient is to be discussed at handover. CCDHB has acknowledged that at the time of these events, the handover sheet did not provide or encourage a registrar to document the outcome of the handover discussion adequately. Accordingly, no notes were made of what was discussed in relation to the outcome of the meeting.

26. Dr C told HDC that at the handover meeting he presented Ms A's history and his objective examination findings. He presented these both verbally and descriptively (mapping out the wound and the area of sensory loss on his own leg) so that the team, including the SMO, could see the area of sensory loss. At the meeting they also reviewed the X-ray films.

27. Orthopaedic consultant surgeon Dr B was the SMO at the handover meeting. It was decided not to explore the wound surgically.

28. Dr B told HDC that he has no recollection of these events specifically but that from the handover he received, he did not envisage that there would be any additional problems. He said:

> "I was satisfied that she should be well looked after by her general practitioner and would be referred back to the orthopaedic service if there were any questions or concerns about her on-going recovery. The orthopaedic department at [the public hospital] is open seven days a week and patients can return to our service at any time, or be referred by their general practitioner at any time for follow-up."

29. Dr C said that he called Ms A and advised her that surgery was not indicated, and to see her GP if she had any concerns. He told HDC:

> "I would have informed her that we would be happy to review her in orthopaedic fracture clinic if she had any concerns, as I always give this advice to every patient I have reviewed acutely and/or subsequently contacted by phone."

30. No arrangements were made for Ms A to be followed up by the Orthopaedic Service. CCDHB told HDC that Ms A was not re-referred to the orthopaedic fracture clinic for further assessment, as she had been referred back to her GP. CCDHB noted that once a patient has been discharged to his or her GP, with only the GP responsible for following up, the patient remains under the care of the GP and can be referred to the hospital if necessary.

Ms A's recovery process

31. Ms A told HDC that she spent the next three months trying to recover from the wound on her leg and the pain in her foot. The wound became infected and left her with "a nasty scar" on her leg. She said that the pain on the bottom of her foot was sometimes so painful that she could not stand or go to work.

32. Ms A's GP notes report numbness in the left foot localised over the plantar[2] and lateral aspect[3] of the sole. Some of the pain was described as stabbing and an electric-shock-type feeling not related to putting weight throughout the foot. Ms A's GP prescribed nortriptyline.[4]

33. Ms A reported that six months later, "the pain had only got worse". She saw a physiotherapist and a sports medicine doctor. The sports medicine doctor referred Ms A to an orthopaedic surgeon, who referred her on to a plastic and reconstructive surgeon, Dr E.

34. Ms A saw Dr E on 17 September 2015. Ms A said that after Dr E had examined her, he told her that "the nerve should have been operated on within 48 hours as there had been serious damage to the main nerve that went through to the bottom of [her] foot and toes". Dr E diagnosed an injury to the tibial nerve and, in particular, the nerve fibres forming the lateral plantar nerve, which innervates the outer aspect of the sole of the foot. He considered that Ms A's injury required surgical exploration, with freeing up of the nerve from the scar tissue, and repair of any damage caused at the time of the injury. He also mentioned the possibility of nerve grafting.

35. On 28 October 2015, Dr E operated on Ms A. A neuroma[5] was excised from her right tibial nerve, and a nerve graft was taken from the other side of her leg.

[2] Bottom of the foot toward the heel.
[3] The sides.
[4] A drug used for nerve-related pain.
[5] A benign growth of nerve tissue, often occurring after damage to the outer lining of the nerve.

36. Dr E told HDC that the sensory loss experienced by Ms A is along the lateral border of her foot, and that it "is not considered a significant problem".

37. At the time of Ms A's injury, 40–50% of the circumference of the tibial nerve had been cut, and this had resulted in the neuroma, explaining the numbness in the foot and the neuropathic pain.[6]

38. A year after the surgery, Ms A was discharged from Dr E's care. She said that she no longer has significant pain in her foot, but the muscles in her foot have "decayed dramatically due to the fact that the nerve wasn't connecting to them for so long". Dr E told HDC that there had been some wasting and weakness of some of the muscles in the sole of Ms A's foot following the injury, but that according to his clinic note of 10 October 2016, those muscles had improved in strength.

39. Ms A was referred for physiotherapy to strengthen the muscles in the sole of her foot and to increase the range of movement in her ankle. Clinical records dated 10 December 2015 state that she was reporting very minimal pain and increasing strength of the muscles in her left foot.

Further information

40. CCDHB told HDC that as the orthopaedic registrar on call, Dr C would have been expected to respond to a large number of calls to the fracture clinic and the ED, as well as to be on call to provide an orthopaedic opinion on inpatients in other services. All of these patient contacts would have been discussed with the on-call SMO at the meeting the next morning.

41. CCDHB said that there is facility to have patients return to the Orthopaedic Clinic either that morning or to a booked clinic over the next week, to allow both immediate reassessment of any patients or early clinic review. It said that there is insufficient manpower or clinic space to have every patient seen by the resident medical officers (RMOs) return to be reviewed by the supervising SMO.

42. CCDHB stated that the follow-up arrangements for Ms A were based on the assessment of the severity of the injury. The assessment was thorough, but Dr C's working diagnosis was, in hindsight, incorrect. CCDHB further said that based on the information provided to Dr B, it "seems entirely reasonable that he would not recommend immediate exploration. … It is also understandable for him to recommend GP follow-up if he was led to believe that laceration was innocuous as to be superficial and involved a terminal branch he was unlikely to repair".

43. CCDHB also said that Dr B had no reason to believe that Dr C had made an error in his working diagnosis.

[6] Pain caused by direct damage or disease to a nerve.

44. Regarding supervision of junior registrars, CCDHB said:

> "The problem is the issue of the 'unknown unknowns'. If in a busy handover meeting, a registrar who is known to be very thorough and conscientious presents the findings and his conclusion, then it is possible to see how this diagnosis might be confirmed and the subsequent decisions made."

45. CCDHB acknowledged that an error occurred in the management of Ms A's nerve injury. It said:

> "In retrospect it does appear that she should have been asked to attend orthopaedic clinic for review the following week, or immediately referred to the plastic surgeons for review."

46. I note that CCDHB has stated that it would be happy to meet with Ms A to apologise in person and explain why the decisions that were made at the time of her attendance to ED were made.

47. CCDHB told HDC that Ms A's case was discussed at an Orthopaedic Department audit meeting. Undiagnosed nerve injuries and the severity of them were discussed, as was the need to ensure that patients receive clear guidelines on who will manage their care after discharge. CCDHB has since updated its handover form to ensure that the outcomes of patients' reviews are documented clearly. In addition, in July 2017 a review was commenced of all information provided to orthopaedic registrars. CCDHB intends to provide its orthopaedic registrars with formalised documentation of the Department's expectations around the communication of patient management information between junior and senior clinicians.

Dr B

48. Dr B told HDC that the symptoms Ms A went on to experience were not present at the time of her initial presentation and assessment by Dr C. Dr B further stated:

> "In my opinion, [Dr C] made a thorough assessment of the injury. With the benefit of hindsight we now know that he did not identify partial laceration to the deeper lying tibial nerve."

49. Dr B told HDC that it is his usual practice to review the patient following handover, but that in this case Ms A had been discharged. He said: "In my opinion, she should have been kept in hospital until the morning for observation and assessment during the morning rounds." He also stated:

> "The on call registrar did not consult with me during his overnight shift, which meant that I was not able to give [Dr C] appropriate management advice … She would have been advised to stay until the morning review for clinical assessment, instead of being discharged into the care of her GP."

50. Dr B told HDC that as a result of this case, he now advises any junior orthopaedic staff to keep patients in for observation to be reviewed by senior members of the orthopaedic staff the next day, or to be brought back for review in the morning if they have presented with a laceration around the neurovascular structures.

Dr C

51. Dr C told HDC that he checked for damage to other nerves and found no evidence of "serious damage to the main nerve that went through to the bottom of her foot and toes", and that he documented this clearly in his notes. He stated:

> "However, reflecting upon this case and reviewing anatomical papers, the nerve branch affected may have been a branch of the tibial nerve … Based upon my examination documentation, I was confident there was no other tibial nerve branch damage such as the medial and lateral plantar branches."

52. Dr C believes that he "carefully assessed her injury, provided an adequate safety plan, [and] discussed her presentation and findings with the on-call consultant, and [is] confident [that he] relayed this back to [Ms A] personally via a phone conversation".

53. Dr C said that although at the time it was not standard protocol to document outcomes of the handover meetings or subsequent patient communications, this is now current practice.

54. Dr C stated:

> "[I now consider that] it would have been preferable for [Ms A] to have been formally reviewed at Fracture Clinic, or alternatively referred to the plastic surgeons for review, given that there had been a nerve injury. I would like to clarify that no-one present at the handover meeting suggested that a plastics referral be done.
>
> …
>
> You will note that I had been in my position of orthopaedic registrar for less than 3 months at the time of this consultation, and I was very careful to discuss all cases, including [Ms A's] injury, with appropriate senior staff, to ensure I had an accurate diagnosis, management plan, and follow up plan for all of my acute referrals. However, I acknowledge my role in this omission and would like to apologise to [Ms A] for this."

55. Dr C stated that Ms A did not fulfil the requirements for acute admission, as her injury was non-urgent. He said that he did not call the on-call consultant that night, as he had not been informed that he needed to for nerve injuries.

56. Dr C said that after these events he made the following changes:

> "[I]f there is any clinical suspicion of a nerve laceration I personally discuss the case with the Plastic surgical team regarding appropriate management. I recognise that if

> a repair is indicated this is best done within 48 hours, and by communicating directly with the Plastic surgical team it will enable this to occur."

57. He also said that he now personally records his acute assessment outcomes electronically following consultant advice, and also records any patient communications in the file.

58. Dr C stated:

> "I acknowledge that I did not correctly identify the specific nerve that was damaged in [Ms A's] injury, and believe this was a consequence of the level of anatomical surgical knowledge I possessed at the time of the above case."

Responses to provisional opinion

59. The parties were all given the opportunity to respond to relevant sections of my provisional opinion.

60. Ms A responded that the "information gathered" was a "good account of what happened". She also stated that she was pleased to see the changes that were made as a result of these events.

61. CCDHB stated: "The case has been well documented, and I believe your conclusions are appropriate." It also stated that it is "a fair and balanced report on an unfortunate outcome for [Ms A]". Other comments have been incorporated where relevant.

62. Dr B stated that he had nothing else to add.

Opinion: Capital & Coast DHB — breach

Lack of follow-up by a senior member of the orthopaedic team

63. My expert advisor, Professor Theis, advised that in the morning after Ms A's presentation, Dr C appropriately discussed her injury with the supervising consultant (Dr B), "who [based on the information presented to him by Dr C] obviously decided that it was not necessary to surgically explore the wound".

64. However, Professor Theis advised that these events highlight issues regarding the supervision of junior registrars, and that "appropriate supervision of junior registrars has to be in place". I note that there was no reassessment or follow-up of Ms A by a senior clinician from the Orthopaedic Service on the day of admission or at any stage afterwards. CCDHB has acknowledged "in retrospect" that Ms A should have been asked to attend the Orthopaedic Clinic for review the following week, or referred to the plastic surgeons immediately for review. However, CCDHB also said that there is insufficient manpower or clinic space to have every patient seen by the RMOs return to be reviewed by the supervising SMO.

65. Professor Theis advised that the follow-up steps taken were sub-standard and a significant departure from the accepted standard of care. He said that there was no follow-up by the Orthopaedic Service, which resulted in a missed opportunity to reassess Ms A and have her examined by a more senior clinician. Professor Theis noted that "appropriate communication and follow up of patients has to occur for safe and quality surgical care".

66. I note that CCDHB said that Dr B had no reason to believe that Dr C had made an error in his working diagnosis. As stated by CCDHB, "The problem is the issue of the 'unknown unknowns'."

67. I note that there was a system in place for registrars to contact the on-call SMO, but there was no direction to the registrars, such as by way of a policy or guideline, that this had to be done in such cases as Ms A's presentation. At the time of these events, there was no policy, suggested pathway, or common practice, that such injuries should be reviewed by a senior clinician. At the time of these events, Dr C had been in his role as orthopaedic registrar for less than three months. I consider that it is important for junior staff to have adequate support to enable the provision of safe care to patients, and in failing to have such a system in place, I find that CCDHB breached Right 4(1) of the Code.

Documentation — other comment

68. Although Ms A was contacted the following day, there is no documentation of this. There is also no documentation regarding the outcome of the discussion between Dr C and Dr B in relation to Ms A at handover. I note that it was not usual practice at CCDHB to document what was discussed during handover. Professor Theis stated:

> "I accept that it is often not practical to document every individual decision taken at that meeting and this would be common practice in most orthopaedic departments within New Zealand."

69. However, Professor Theis advised that "ideally this documentation should occur for every patient discussed at the handover meeting". I accept this, and while I note that since these events CCDHB has made changes in this regard, so that such communications are now documented, I am mindful that due to the lack of documentation in this instance, it has been difficult to establish exactly what information was provided to Dr B during Dr C's handover, and what information Ms A was given following the handover.

Opinion: Dr B — adverse comment

Appropriateness of clinical decisions made following assessment

70. At the handover meeting in the morning, Dr C discussed Ms A's case with Dr B, who was the orthopaedic consultant surgeon and SMO.

71. Professor Thesis advised that Dr C appropriately discussed the case with Dr B. Dr B told HDC that based on the information presented to him by Dr C, he was comfortable with the management plan and did not see the need to recall Ms A for further assessment.

72. I note that Professor Theis considers that this decision was not appropriate, and was a significant departure from the accepted standard of care. He stated:

> "Any deep penetrating injury overlying a neurovascular structure (nerve, artery and vein) in the presence of sensory and/or motor findings (numbness and/or weakness paralysis of muscles) requires [surgical] exploration to ascertain the integrity of the underlying anatomical structures and repair [of] those that have been damaged."

73. Professor Theis said that alternatively, follow-up advice should have been given to ensure that review by the service occurred over the next week or so. He advised:

> "Exploration of the wound does not necessarily have to be done immediately in case of a nerve injury but can safely be carried out within a week or two after the wound [has been] sutured."

74. It has been accepted that Dr C did not correctly identify the specific nerve that was damaged in Ms A's injury, and it is not known exactly what information was presented to Dr B at the time of the handover, as it was not usual practice at CCDHB to document what was discussed.

75. I note that Dr B told HDC that as Dr C did not consult him during the night, he was unable to provide appropriate management advice. Dr B stated that had he been consulted, "[Ms A] would have been advised to stay until the morning review for clinical assessment, instead of being discharged into the care of her GP". He said that his usual practice is to review the patient following handover, but that in this case Ms A had been discharged. Dr B considers that Ms A should have been kept in hospital until the morning, for observation and assessment during the morning rounds.

76. Unfortunately, the system in which Dr B was operating required him to make decisions in relation to patients he had not reviewed himself. He was therefore reliant on the handover of information from the junior registrar.

77. In light of the lack of documentation of the handover, I am unable to make a finding that Dr B had all the information necessary to decide to review Ms A, but I accept the advice of Professor Theis that an injury in this area coupled with loss of sensory and/or motor findings (numbness and/or weakness or paralysis of muscles) normally requires surgical exploration. Therefore, I am critical that Dr B, as the senior orthopaedic consultant, was

aware of the general area of the injury yet did not advise that Ms A be recalled, whether that morning or over the next week or so.

Recommendations

78. I recommend that CCDHB:

a) Use this report as part of a case study for training purposes of orthopaedic registrars in relation to missed diagnoses.

b) Emphasise to its orthopaedic clinicians, as part of their induction and ongoing training, that all penetrating injuries overlying a neurovascular structure with sensory or motor signs be assessed by an SMO regarding the need for surgical exploration.

c) In relation to the facts of this case, consider whether its systems can be improved to ensure that appropriate supervision is in place for its junior registrars, namely to ensure that patients who present with penetrating injuries overlying a neurovascular structure are always reviewed by a senior clinician.

79. CCDHB is to provide HDC with an update on the above recommendations, within six months of receipt of this opinion.

80. I also recommend that CCDHB provide a letter of apology to Ms A. This is to be sent to HDC for forwarding, within three weeks of the date of this report.

Follow-up actions

81. A copy of this report with details identifying the parties removed, except the expert who advised on this case and CCDHB, will be sent to the Medical Council of New Zealand, and it will be advised of Dr B's name.

82. A copy of this report with details identifying the parties removed, except the expert who advised on this case and CCDHB, will be sent to Central TAS and the New Zealand Orthopaedic Association.

83. A copy of this report with details identifying the parties removed, except the expert who advised on this case and CCDHB, will be placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.

Appendix A: Independent orthopaedic advice to the Commissioner

The following expert advice was obtained from Professor Jean-Claude Theis:

"Thank you for your letter dated 2.2.17 asking me to provide expert advice to the Health and Disability Commissioner on the care provided by Capital and Coast DHB to [Ms A] on 6.2.16.

In providing an opinion to the Commissioner in this case I can confirm that I have read and followed the Commissioner's Guidelines for Independent Advisors dated June 2016.

I am a qualified orthopaedic surgeon with 30 plus years of experience and have provided independent advice in the past to the ACC and the New Zealand Court system.

In preparing my report I have reviewed the following documents:

- Your letter to myself dated 2.2.17
- Letter of complaint by [Ms A]
- Response from Capital and Coast District Health Board dated 9.11.16
- Response by [Dr C] dated 1.11.16
- Comment and clinical notes from [Dr E] including a letter to [HDC] dated 31.10.16, copies of clinical notes between 17.9.15 and 10.10.16, handwritten notes and a drawing by [Dr E] dated 17.9.15, letter by [Dr E] to [orthopaedic surgeon] dated 17.9.15, 9.11.15, 10.12.15 and 17.3.15, letter by [Dr E] to [physiotherapist] dated 12.11.15 and a letter by [Dr E] to [the GP] dated 10.10.16.
- I also reviewed the complainant's x-rays taken at [the public hospital] on 6.2.15

Please note that I have no personal or professional conflict of interest in this case.

Summary of Events

[Ms A] is a 24 year old woman who suffered a penetrating wound to the medial aspect of her left leg […]. There was some immediate bleeding and she noticed immediate altered sensation in her left foot.

She attended the Emergency Department of [the public hospital] and according to the triage records she was first seen on 6.2.15 around 2300 hours. She was initially assessed by an ED doctor who assessed her wound on the left leg which was described as an inverted U-shaped laceration measuring 5cm and localised about 10cm above the medial aspect of the ankle joint. The doctor noted that there were no fragments of glass in the wound but that there was an area of numbness along

the medial aspect of the heel. According to the ED notes there was no damage to the blood supply or the sensation of the rest of the foot and toes.

The emergency doctor called the orthopaedic registrar on call, [Dr C] who also assessed the patient and he confirmed the size and location of the laceration. He states that he did a sensory examination of the ankle and foot and noticed a sensory loss measuring approximately 6cm in diameter over the medial aspect of the heel. He also states that he checked for any damaged tendons or artery and did not find any evidence of either. Apparently the sensation of the rest of the ankle and foot was normal. He made a diagnosis of a possible transection of what he describes as the 'medial crural branch of the saphenous nerve'. He apparently informed the patient that the glass had cut a small sensory nerve and that he was not sure whether it was possible to surgically repair this.

He advised the patient that he would discuss the case with the orthopaedic consultant surgeon on call the next morning during the handover and in particular whether the nerve should be repaired or not.

After that the doctor cleaned the wound and sutured it. The patient was allowed to go home but warned not to eat or drink anything in case it was decided the next morning to carry out an operation to repair the nerve. Apparently the patient was also advised that she would be phoned in the morning with further instructions.

Her case was discussed the next morning with [Dr B], the orthopaedic consultant surgeon on call and a decision was made not to surgically explore this wound. From the documents made available to myself it is a bit unclear what communication happened with the patient in the morning of 7.2.15. However it appears that no arrangements were made for this patient to be followed up by the orthopaedic service.

It appears that the patient was looked after by her GP.

Over the next few months the patient developed increasing pain as well as numbness in the left foot localised over the plantar and lateral aspect of the sole. Some of the pain was described as stabbing and electric shock type feeling not related to putting weight through the foot which the GP treated with Nortriptyline which is a drug used for neuropathic, ie. nerve related pain.

She was eventually referred to [an orthopaedic surgeon] who subsequently referred her to [Dr E], plastic and reconstructive surgeon. She was examined by [Dr E] on 17.9.15 and he made a diagnosis of an injury of the tibial nerve and in particular the nerve fibres forming the lateral plantar nerve which innervates the outer aspect of the sole of the foot. He felt that this required surgical exploration, freeing up of the nerve from the scar tissue and repairing any damage caused at the time of the injury but he also mentioned the possibility of nerve grafting by taking part of the sural nerve which is a sensory nerve innervating the outer aspect of the leg and foot.

Surgery was carried out on 28.10.15 and a neuroma was excised from the right tibial nerve followed by multiple cable grafting using a sural nerve graft. Basically what happened at the time of the injury was that the tibial nerve was cut partially (40–50% of the circumference of the nerve according to the operation notes) and this had resulted in a neuroma explaining first of all the numbness in her foot and also the neuropathic pain. Following the surgery, her pain was markedly improved but had some pain in the area where the nerve graft was taken which apparently settled over time. [Dr E] also noticed that she had some wasting and weakness of some of the muscles in the sole of her foot following the tibial nerve injury and according to his last clinic noted dated 10.10.16 those muscles had improved in strength. The patient was also referred for physiotherapy to strengthen the muscles in the sole of her foot and also to increase the range of movement of her ankle. The last clinical record is dated 10.12.15 and she was reporting very minimal pain and increasing strength of the muscles in her left foot.

In answer to your specific questions:

- **The appropriateness and adequacy of the orthopaedic assessment provided to [Ms A] on 6.2.15**

[Ms A] was assessed by [Dr C] a junior orthopaedic registrar who was working under supervision of the consultant orthopaedic surgeon on call which I understand was [Dr B]. [Dr C] assessed [Ms A's] injury adequately in the sense that he diagnosed a nerve injury and excluded an arterial or tendon injury but unfortunately identified the nerve as a branch of the saphenous nerve whereas in fact it was the tibial nerve which was damaged. However [Dr C] appropriately discussed the case with his supervising consultant the next morning who obviously decided that it was not necessary to surgically explore the wound. I assume that he made this decision on [Dr C's] diagnosis of a branch of the saphenous nerve which is a smaller and lesser nerve than the tibial nerve. The saphenous nerve is purely sensory whereas the tibial nerve has sensory and motor fibres innervating the muscles of the sole of the foot.

Overall I am of the opinion that [Dr C's] assessment of [Ms A] on 6.2.15 was appropriate in the sense that he recognised the nerve injury but unfortunately his diagnosis was not anatomically correct.

- **The appropriateness of the clinical decisions made following the orthopaedic assessment**

[Dr C] appropriately discussed the case with his supervising consultant orthopaedic surgeon who unfortunately did not examine the patient himself and therefore based his decision not to operate on the wrong diagnosis.

It is my opinion that any deep penetrating injury overlying a neurovascular structure (nerve, artery and vein) in the presence of sensory and/or motor findings (numbness and/or weakness paralysis of muscles) requires exploration to ascertain the integrity of the underlying anatomical structures and repair those that have been damaged. In

this particular case the laceration was over the posteromedial aspect of the distal leg overlying the course of the tibial nerve artery and vein.

I therefore conclude that the clinical decisions made following the orthopaedic assessment were not appropriate and in my opinion resulted in a significant departure from the standard of care or accepted practice.

- **The adequacy of follow up steps taken and advice given**

It appears that [Ms A] was not followed up by the orthopaedic service and therefore an opportunity missed to reassess her and have her examined by a more senior clinician. Exploration of the wound does not necessarily have to be done immediately in case of a nerve injury but can safely be carried out within a week or two after the wound was sutured.

It is my opinion that the follow up arrangements in this particular case were sub-standard and in my opinion a significant departure from standard of care or accepted practice.

- **Any other comments you consider pertinent to make which has not been mentioned above**

This case has highlighted a number of deficiencies in the clinical care of [Ms A] as follows:

1. Missed diagnosis of partial laceration left tibial nerve as a result of a penetrating injury to the posteromedial aspect of the left leg which was not surgically explored.
2. Poor documentation of the discussion between the orthopaedic registrar, [Dr C] and his supervising consultant [Dr B] on the morning after [Ms A's] presentation to the Emergency Department.
3. Lack of follow up following the ED presentation and assessment of the patient by a senior member of the orthopaedic team.

The lesson learnt from this case is that all penetrating injuries overlying a neurovascular structure with sensory or motor signs require surgical exploration, clinical decision making on patient management needs to be documented in the patient's notes, appropriate supervision of junior registrars has to be in place and appropriate communication and follow up of patients has to occur for safe and quality surgical care.

Please don't hesitate to contact me if you need any further information.

Yours sincerely

J-C. Theis
Professor of Orthopaedic Surgery"

The following further expert advice was received from Professor Theis:

"Thank you for your emails dated 12.12.17 and 23.1.18 in relation to the above. I have had the opportunity to review the following documents provided by you:

- Letter by [Dr B], Orthopaedic Surgeon to [HDC] dated 28.9.17
- Letter by [the] Orthopaedic Service Manager, Capital and Coast District Health Board to [HDC] dated 28.9.17 including a total of 15 appendices
- Letter by [Dr D] dated 4.9.17
- Letters by [an] Orthopaedic Surgeon to the Health and Disability Commissioner dated 31.8.17
- Letter by [an] Orthopaedic Surgeon to [HDC] dated 12.9.17
- Letter by [Dr C] to [HDC] dated 7.9.17
- Letter by [Dr C] to [HDC] dated 13.10.17

You have asked me to review this additional information and to advise whether it has changed my earlier advice in any way.

In my report dated 10.2.17 I identified three deficiencies in the clinical care of [Ms A].

1. Missed diagnosis of partial laceration of the left tibial nerve as the result of a penetrating injury to the posteromedial aspect of the left leg which was not surgically explored. The additional information does not change my advice that any penetrating injury overlying a neurovascular structure (nerve, artery and vein) in the presence of a sensory abnormality (numbness) as was the case here should be explored surgically. This did not happen in this case and I am therefore of the opinion that this omission resulted in a significant departure from the standard of care or accepted practice.

2. In relation to the documentation of the discussion between the orthopaedic registrar [Dr C] and his supervising consultant [Dr B] on the morning after [Ms A's] presentation to the Emergency Department I understand that Capital and Coast DHB have a policy to enter all the patients seen by the orthopaedic registrar on call onto a handover list which is discussed the next morning. I accept that it is often not practical to document every individual decision taken at that meeting and this would be common practice in most orthopaedic departments within New Zealand therefore I feel that this is current practice although ideally this documentation should occur for every patient discussed at the handover meeting. I therefore would like to revise my advice by saying that this lack of documentation is compatible with current practice but the standard of care should be that these discussions are documented in the patient notes.

3. As far as the lack of follow up following the ED presentation and assessment of the patient by a senior member of the orthopaedic team is concerned, I still believe that the patient should have been followed up in an orthopaedic clinic to allow [Dr B] to examine [Ms A] in order to confirm [Dr C's] diagnosis and if not

carry out further investigations and/or surgical exploration if required. I do not think that the patient necessarily needed to be admitted as she could have been booked into a clinic within a week or two for further clinical evaluation of her injury and monitoring of her progress. I don't think that in this case the general practitioner would have made the diagnosis of a partial lesion of the tibial nerve and referred the patient back to the orthopaedic department. This is of course quite different from monitoring simple wounds which the GP is certainly able to carry out without further input from the orthopaedic department.

I therefore have no reason to change my earlier advice that this was a significant departure from the standard of care or accepted practice.

Please don't hesitate to contact me if you need any further information.

Yours sincerely

J-C. Theis
Professor of Orthopaedic Surgery"