Radiology Services

Radiologist, Dr B

Taranaki District Health Board

A Report by the

Health and Disability Commissioner

(Case 15HDC01204)

Health and Disability Commissioner
Te Toihau Hauora, Hauātanga

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Executive summary

1. On 18 February 2013, Mr A presented to the Emergency Department (ED) at a public hospital, as he had developed left-sided chest pain when doing physical work. He also had shortness of breath, a feeling of illness since the previous day, and a chronic cough. Dr C reviewed Mr A and ordered a chest X-ray. Dr C diagnosed pneumonia and recommended admission to the ward, but Mr A declined. On discharge, Dr C told Mr A to follow up with his GP, but did not specify a timeframe for this. The discharge summary was sent to Mr A's GP, Dr D.

2. The chest X-ray was reported on the following day, and the findings were "a dense pneumonic consolidation" in the left upper lobe of the lung. The report recommended a follow-up X-ray in 10–14 days' time to ensure resolution. Dr C and Dr D both received the chest X-ray report, but neither took any action in respect of it. Mr A did not present to Dr D for follow-up of his pneumonia.

3. On 7 May 2013, Mr A presented to an accident and medical clinic, as he had hit his left upper arm the previous day and could not lift his arm. The doctor ordered a shoulder X-ray. The X-ray was reported on by radiologist Dr B. The report stated: "No significant change from October 2008, with mild subacromial spurring redemonstrated. This would not exclude underlying cuff injury or degeneration." A mass in the left upper lobe of the lung, visible in the first of the two views taken, was not commented on.

4. In June 2015, the radiology service discovered that there was a random, transient issue with auto-magnification of images for plain film X-rays affecting two workstations, one of which was Dr B's. It is not known when this issue began. On the day of reporting Mr A's X-ray, there were inadequate radiologist resources available at the radiology service relative to the workload experienced.

5. On 28 January 2014, Mr A presented to the ED at the public hospital with left-sided chest pain. A chest X-ray and left shoulder X-ray were carried out. The left shoulder X-ray reported "a very large left upper lung mass". Subsequently, Mr A was diagnosed with T3N1 squamous cell carcinoma[1] of the left upper lobe. He underwent concurrent chemotherapy and radiation therapy but, sadly, he died.

Findings

6. In her radiology report of 7 May 2013, Dr B failed to identify the left upper lobe lung mass. Despite the potential IT issue and the workplace circumstances that existed at the time, in the Commissioner's view, this abnormality should have been identified and reported on. By failing to do this, Dr B did not provide services to Mr A with

[1] Squamous cell carcinoma is a type of cancer. "T" relates to the size of the tumour (with 3 meaning that the tumour is more than 7cm, has grown into the chest wall, has grown into a main bronchus, has grown into the airways, or there are two or more separate tumour nodules in the same lobe), and "N" relates to how many lymph nodes the cancer has spread to (with 1 meaning 1–2 lymph nodes).

reasonable care and skill and, therefore, breached Right 4(1)[2] of the Code of Health and Disability Services Consumers' Rights (the Code).

7. The Commissioner was critical of the radiology service in that there were workplace stressors at the radiology service that Dr B felt impacted on her work.

8. The Commissioner made adverse comment that Dr C should have provided more specific instructions to Mr A on discharge, and that Dr C's communication about follow-up of the X-ray could have been improved.

9. Taranaki District Health Board (TDHB) did not have a clear, effective, and formalised system in place for the reporting and following up of test results. The Commissioner would expect such a system to include a policy requiring the clinician to instruct the patient leaving the ED to follow up any outstanding test result with an identified provider, normally his or her GP. The Commissioner found that TDHB did not provide services to Mr A with reasonable care and skill, and breached Right 4(1) of the Code.

10. The Commissioner made adverse comment that Dr D was not more proactive in confirming his assumption that Dr C would be acting on the recommendation in the X-ray report.

Recommendations

11. The Commissioner recommended that Dr B have an independent radiologist peer perform a review of a random selection of her reports completed in the last 12 months, and that Dr B provide a written apology to Mrs A.

12. The Commissioner recommended that TDHB review its ED policy to ensure that there is a clear process for the handover of care from ED to GPs, including follow-up of tests and X-rays ordered in ED, and provide a written apology to Mrs A.

13. The Commissioner recommended that the National CMO Group work to put in place clear practice guidelines regarding the interface between emergency departments and general practitioners in relation to follow-up of test results, within all DHBs.

Complaint and investigation

14. The Commissioner received a complaint from Mrs A about the services provided to her late husband, Mr A, by the radiology service and TDHB. The following issues were identified for investigation:

- *Whether radiologist Dr B provided Mr A with an appropriate standard of care in May 2013.*

[2] Right 4(1) of the Code states: "Every consumer has the right to have services provided with reasonable care and skill."

- *Whether the radiology service provided Mr A with an appropriate standard of care in February and May 2013.*

15. The investigation was extended to include the following issue:

- *Whether Taranaki District Health Board provided Mr A with an appropriate standard of care in February 2013.*

16. The parties directly involved in the investigation were:

Mrs A	Complainant
Dr B	Radiologist
Radiology service	Provider
Taranaki District Health Board	Provider

Also mentioned in this report:

Dr E	Radiologist
Dr F	General practitioner
Dr G	Radiologist

17. Information was also reviewed from:

Dr C	Emergency Department Senior Medical Officer
Dr D	General practitioner
Medical centre	Provider
Accident Compensation Corporation	

18. Independent expert advice was obtained from a radiologist, Dr Mark Leadbitter (**Appendix A**).

19. Independent expert advice was obtained from an emergency medicine specialist, Dr Tom Jerram (**Appendix B**).

20. In-house clinical advice was obtained from general practitioner Dr David Maplesden (**Appendix C**).

Information gathered during investigation

Background

21. Mr A, aged 67 years at the time of these events, was a long-term cigarette smoker. His medical history included hypertension,[3] chronic obstructive pulmonary disease,[4] atrial

[3] Hypertension is high blood pressure.
[4] Chronic obstructive pulmonary disease is a lung disease that causes difficulty breathing.

fibrillation,[5] and type 2 diabetes mellitus.[6] Mr A was taking a number of regular medications including metformin,[7] aspirin,[8] Accupril,[9] and Cardizem.[10]

22. This report concerns the radiology care provided to Mr A by radiologist Dr B and the radiology service. It also addresses the care provided to Mr A by TDHB, TDHB Emergency Department (ED) Senior Medical Officer (SMO) Dr C, and general practitioner (GP) Dr D at the medical centre.

Presentation to the public hospital — 18 February 2013

23. On 18 February 2013, Mr A presented to the ED at the public hospital as he had developed left-sided chest pain when doing physical work. He also had shortness of breath, a feeling of illness since the previous day, and a chronic cough[11] (that remained unchanged). He was seen by nursing staff and had observations taken, but his temperature was not taken. Blood tests and an electrocardiogram[12] were carried out.

24. Dr C reviewed Mr A and ordered a chest X-ray. The chest X-ray referral stated: "Chest pain and [shortness of breath]. [Rule out] pneumothorax."[13] Dr C recorded in the clinical records that Mr A had a smoking history, but did not record details of this, such as the duration and frequency of smoking. The chest X-ray referral did not note Mr A's smoking history. Mr A's wife, Mrs A, stated that, therefore, Dr C did not provide adequate clinical history on the referral. Dr C and TDHB told HDC that a patient's smoking history is not generally provided with an X-ray request.

25. The blood test results showed a slightly elevated white cell count,[14] a slightly elevated neutrophil level,[15] and a slightly elevated troponin T level.[16] The electrocardiogram was normal. Dr C reviewed the chest X-ray and recorded that it showed left lower lobe[17] and left perihilar[18] infiltrate.[19] Dr C told HDC that Mr A presented with symptoms concerning for pneumonia,[20] and the chest X-ray confirmed this diagnosis.

[5] Atrial fibrillation is an abnormal heart rhythm, where the heart beats rapidly and irregularly.
[6] Type 2 diabetes mellitus is a metabolic disorder where the body does not produce enough insulin, or the cells in the body do not recognise that insulin is present, resulting in high blood sugar levels.
[7] Metformin is a medication that helps control blood sugar levels.
[8] Aspirin is a medication that relieves pain and reduces inflammation.
[9] Accupril is an angiotension converting enzyme inhibitor medication used to treat high blood pressure.
[10] Cardizem is a calcium channel blocker medication used to treat high blood pressure.
[11] A chronic cough is a cough that lasts longer than eight weeks in adults.
[12] An electrocardiogram is a test that records the electrical activity of the heart.
[13] A pneumothorax is a collection of air in the pleural space which causes an uncoupling of the lung from the chest wall.
[14] A high number of white blood cells in the blood indicates that an infection is present.
[15] A high number of neutrophils (a type of white blood cell) in the blood indicates that an infection is present.
[16] A high level of troponin T proteins in the blood indicates that the heart muscle has been damaged, such as occurs with a heart attack.
[17] The left lower lobe of the lung is in the posterior (back) and lower aspect of the left side of the chest.
[18] Left perihilar is the area surrounding the hilum of the left lung (the area in the inner side of the lung, about two-thirds from the base to the apex).

26. Dr C recommended that Mr A be admitted to the ward, but Mr A declined. He was therefore discharged with a prescription for antibiotics and pain medication. TDHB told HDC that it is not unusual to treat pneumonia with oral antibiotics at home.

27. On discharge, Dr C told Mr A to follow up with his GP, but did not specify a timeframe for this. Mr A was provided with a copy of his discharge summary, which stated:

> "**Diagnoses**
> Primary Diagnosis
> — [Left lower lobe] pneumonia, Final. …
>
> **Relevant Results …**
> Chest xray: [left lower lobe] and left perihilar infiltrate …
>
> **Clinical Management**
> Patient with [symptoms] and [workup] consistent with pneumonia. Do not suspect [Acute Coronary Syndrome].[21] Feels better with pain [medication] — in no distress. Very motivated for [discharge] home with [antibiotics], refuses admission, will return if worse.
>
> **Smoking Information**
> Smoking Status: Is smoking: Provided advice to quit
>
> **Advice To Patient**
> Please return to the ED if symptoms worsen. Follow up with your GP. Take antibiotics as prescribed."

28. The discharge summary was also sent to Mr A's GP, Dr D.

29. Mrs A told HDC that Dr C's discharge instructions were unclear to Mr A. Dr C told HDC that the discharge summary was appropriate, as it contained detailed instructions on the medications prescribed, recommended follow-up with Mr A's GP, and requested that Mr A return to the ED if his symptoms worsened. TDHB told HDC that Mr A may not have understood that Dr C expected him to follow up with his GP, and stated that this may have been alleviated if Dr C had given a specific timeframe around the follow-up request.

30. TDHB accepts that the plan for GP follow-up could have been more definitely stated. However, it noted that there was an expectation that, if Mr A remained symptomatic, he would be prompted to contact his GP for follow-up, and that his GP, on reviewing the chest X-ray report, would be prompted to arrange a repeat X-ray if he felt that this was required.

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[19] A lung infiltrate is the accumulation of an abnormal substance (e.g., fluid) in the lung. It appears white on X-ray and can be caused by several things, including an infection or malignancy.
[20] Pneumonia is a lung infection.
[21] Acute coronary syndrome is a range of heart conditions caused by a sudden reduction of blood flow to part of the heart muscle.

31. Mrs A also queried whether, on discharge, Dr C should have recommended a follow-up chest X-ray, given Mr A's smoking history. Dr C explained that patients with pneumonia are usually followed up for clinical resolution, and repeat X-rays are done on a case-by-case basis.

Reporting of chest X-ray — 19 February 2013

32. The chest X-ray was reported on the next day, 19 February 2013, by radiologist Dr E at the radiology service. It stated:

> "No pneumothorax or pneumomediastinum.[22] There is a dense pneumonic consolidation[23] medially[24] in the left upper lobe[25] and in the lingula.[26] No pleural effusion[27] or cardiac failure.[28] Follow-up imaging in 10–14 days to ensure resolution is recommended."

33. The X-ray report was sent to Dr C and Dr D. The radiology service stated that a copy of an X-ray report is not sent to the patient unless this has been specifically requested on the referral form.

34. The radiology service told HDC that the chest X-ray was interpreted correctly, and that appropriate advice for follow-up imaging was given, as, if the consolidation was an infection, then it would likely have cleared after 10–14 days, whereas a malignant mass would not have cleared and would be evident on follow-up imaging.

Follow-up chest X-ray

35. Dr C and Dr D both received the chest X-ray report, but neither took any action in respect of it. Mrs A stated that, if she and Mr A had understood that the chest X-ray results could indicate diagnoses other than pneumonia, they would have ensured that a follow-up X-ray was done.

36. Dr C stated that, at TDHB, follow-up X-rays are usually handled by the GP, and it would be very unusual for an ED clinician to order a follow-up X-ray at 10–14 days. He stated that this case was most appropriately followed up with a GP. As above, Dr C explained that repeat X-rays are done on a case-by-case basis. He stated that there are no current medical guidelines to support a follow-up chest X-ray at two weeks to ensure pneumonia resolution.

37. TDHB stated that its ED policy regarding the follow-up of test results in the ED and handover of care to GPs is:

[22] Pneumomediastinum is a collection of air in the mediastinum (the middle section of the chest cavity).
[23] A pulmonary consolidation is a region of lung tissue that has filled with fluid. The most common cause is pneumonia, but malignancy is also possible.
[24] Medially means in the middle.
[25] The left upper lobe of the lung is in the upper aspect of the left side of the chest.
[26] The lingula of the lung is a small projection from the lower portion of the upper lobe of the lung.
[27] Pleural effusion is a condition where excess fluid builds up around the lung.
[28] Cardiac failure occurs when the heart is unable to pump sufficiently to maintain blood flow to meet the body's needs.

> "ED SMOs review all of the laboratory and radiology results that are requested in the department during their shifts. They also complete an [electronic discharge summary (EDS)] for each patient primarily seen during their shifts. Every ED patient's diagnostic test results and EDS are sent electronically to the patient's GP. Results reported after an ED patient's discharge … are followed up by both the ED SMO and the patient's GP, depending on the action required."

38. TDHB said that, with pneumonia, if the patient's symptoms improve after treatment, then a follow-up X-ray may not be required. Thus, repeat X-rays are not booked by ED doctors at the time of review of the radiology report. TDHB told HDC that it would have been reasonable to expect that Mr A did not require another chest X-ray to confirm resolution of his pneumonia if, on follow-up, his pneumonia had cleared clinically. Therefore, Dr C would not have felt it necessary to contact Mr A or his GP to ensure that another chest X-ray was taken.

39. Dr D cannot remember reviewing the chest X-ray report, but stated that it is likely that he would have presumed that the ED, as the requestor of the X-ray, would arrange the recommended follow-up imaging. He stated that normal practice is for the requesting doctor to arrange follow-up of any abnormal test result, including X-ray findings. Dr D believes that Dr C or one of his ED colleagues should have acted on the chest X-ray results, either by requesting the follow-up chest X-ray themselves or by contacting him directly to clarify who was taking responsibility for informing Mr A and arranging the follow-up X-ray.

40. Dr D stated that he is not sure why he did not set a reminder in the computer system when he received the chest X-ray report, so that he would be aware if the expected follow-up chest X-ray results were not received in a reasonable timeframe. He acknowledged that, as a GP, he has a secondary responsibility to make sure that significant abnormal results received by him, but requested by someone else, are acted upon. Dr D stated that he may have presumed that he would be seeing Mr A soon (as the discharge summary stated that GP follow-up was recommended), and that he would be able to arrange the follow-up X-ray then.

41. The radiology service told HDC that the ultimate responsibility to act on a radiology report lies with the referrer and/or receiver of the report. TDHB stated that repeat X-rays are not booked by the radiology service because, if the patient's symptoms improve after treatment, a follow-up X-ray may not be required.

GP follow-up

42. Mr A did not present to Dr D for follow-up of his pneumonia, as recommended by Dr C on discharge. Dr D stated that, had this happened, he would have discussed the X-ray report and arranged for a follow-up chest X-ray, if arrangements had not already been made by the ED.

43. Mr A presented to Dr D on 17 April 2013 to obtain prescriptions for his usual medications. Routine blood tests were carried out. Dr D stated that, although Mr A did not mention any problems with his chest, he encouraged him to try to stop smoking. Dr D did not notice that Mr A had not had the recommended follow-up chest X-ray.

Presentation to the accident and medical clinic — 7 May 2013

44. On 7 May 2013, Mr A presented to the accident and medical clinic, as he had hit his left upper arm the previous day and could not lift his arm. Dr F examined Mr A, noting that previously he had had a torn ligament in his left shoulder. Her impression was: "[R]ule out fracture humeral head[29]/dislocation. ?Any axillary nerve[30] damage. Likely [musculoskeletal][31] pain." Dr F ordered a left shoulder X-ray. The X-ray referral stated: "[W]alked into [object] yesterday with left shoulder/upper outer arm and now cannot abduct or flex the shoulder." Standard X-ray imaging was undertaken by a radiographer at the radiology service, showing two views of the shoulder.

45. Dr F then reviewed the X-ray and documented:

> "Please advise [patient] that I have spoken to ortho[paedic] registrar and we cannot see any abnormality on the xray. Likely musculoskeletal pain/swelling and unlikely nerve damage. For sling/NSAIDS[32] as prescribed and await radiology report. If not settling in 1 week or if [symptoms] worsen for review please."

46. A copy of the consultation notes was sent to Dr D.

Reporting of left shoulder X-ray — 7 May 2013

47. On 7 May 2013, the X-ray was reported on by Dr B at the radiology service. The report stated:

> "No significant change from October 2008, with mild subacromial[33] spurring[34] redemonstrated. This would not exclude underlying cuff[35] injury or degeneration."

48. A mass in the left upper lobe of the lung, visible in the first of the two views taken,[36] was not commented on. The X-ray report was sent to the accident and medical clinic and Dr D.

49. Dr B stated that the standard shoulder X-ray imaging that was performed was not the imaging that would have been used specifically to assess for the presence of lung cancer and for viewing the chest area. However, she acknowledged that radiologists are trained always to look for incidental findings on all imaging studies, and to recommend follow-up or further imaging if required. Dr B stated that, as an experienced radiologist, she follows a strict pattern of image analysis, and that, if she had seen the mass, this would have prompted further investigation.

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[29] The humeral head is the end of the bone in the upper arm. It articulates with the scapula at the shoulder joint.
[30] The axillary nerve is a nerve in the armpit connecting to a shoulder muscle, a rotator cuff muscle, and the triceps.
[31] Musculoskeletal refers to joints, ligaments, muscles, nerves, and tendons.
[32] Non-steroidal anti-inflammatory drugs (NSAIDs) are a type of pain relief medication.
[33] Subacromial means below the acromion (the highest point of the shoulder).
[34] A spur is a sharp projection, especially of bone.
[35] The rotator cuff is a group of muscles and tendons that surround the shoulder joint.
[36] In response to the provisional opinion, Dr B specified that the mass was visible on non-magnified views.

IT issue

50. At the time of these events, the radiology service advised that it may have been experiencing an IT issue relating to the display of images. In June 2015, the radiology service discovered that there was a random, transient issue with auto-magnification of images for plain film X-rays affecting two workstations, one of which was Dr B's. It is not known when this issue began, but it was not known to staff in May 2013. When the issue occurred, the first image initially displayed correctly, but after the radiologist scrolled through the other images and returned to the first image, the first image was auto-magnified, cutting off a sizable amount of the image.

51. Dr B told HDC that she genuinely believes that she may have been looking at inappropriately magnified images of the shoulder at the time of reporting, precluding complete visualisation of the entire left lung field, and thus the opportunity to see and report on the lung abnormality. She stated that, if the IT issue occurred in this case, despite the first image initially appearing unmagnified, she would have had bare seconds to register any non-magnified image.

52. Dr B explained that, when the IT issue occurred, the first image became auto-magnified as soon as she scrolled onto it, as she typically does, switching in between the two views to assess the overall appearance and feel of the shoulder. It also auto-magnified as soon as previous X-rays were loaded for review or the image was clicked on (which can be inadvertent). Dr B told HDC that these circumstances would have made it difficult, if not impossible, for her to detect a left upper lobe lung mass visible on a single view.

53. The radiology service stated that, if the IT issue occurred in this case, Dr B would not have known that her first viewing of the image showing the mass would be her only opportunity to identify it formally.

54. Dr B stated that, while she is accustomed to seeing a wide variety of images (from quite focused X-rays over the shoulder joint to inclusion of a portion of the opposite side of the chest, at a range of zoom factors, in a range of slightly varying views), she does not believe she would have picked up the auto-magnification of Mr A's films had she not been subsequently attuned to the possibility of such an issue. She stated that the magnified views simply look like good coned views of the shoulder joint in both planes.

Staffing and environmental issues

55. On 7 May 2013, there were three radiologists working at the radiology service (rather than the usual five), as one was on leave and one was on non-clinical time. The radiology service told HDC that the department workload that day was high, and that Dr B had a very high individual workload. The radiology service concluded that there were inadequate radiologist resources available that day relative to the workload experienced. It also acknowledged potential environmental issues such as staff interruptions.

56. Dr B stated that the unsafe environment in which she was working at the time was a contributing factor to the error, and may have impacted on her cognitive perceptive

abilities that day. She told HDC that, in an environment of low staff levels with a sustained high clinical workload and frequent interruptions, she was not alerted to the need to investigate the left lung field further at that time.

Presentation to the accident and medical clinic — 9 July 2013

57. On 9 July 2013, Mr A presented to the accident and medical clinic with a chesty cough. He was prescribed antibiotics and advised to come back if he had any concerns or his cough did not resolve. A copy of the consultation note was sent to Dr D.

Gastrointestinal investigations

58. On 11 October 2013, Mr A presented to Dr D. Dr D told HDC that Mr A advised that he had been dieting and had lost some weight, and had been experiencing sweats. Dr D stated that he counselled him on smoking cessation and prescribed him Champix.[37] Dr D also requested blood tests, which revealed mild anaemia[38] with an iron deficiency type pattern and raised C-reactive protein.[39] Dr D stated that, as one of the commonest causes of this is a gastrointestinal malignancy, he referred Mr A to the TDHB Surgical Outpatients Department, even though Mr A had no abdominal symptoms, his abdominal examination was normal, and his faecal occult blood test was negative. Dr D did not notice that Mr A had not had the follow-up chest X-ray recommended.

59. On 29 November 2013, Mr A underwent an upper gastrointestinal endoscopy[40] and colonoscopy.[41] The findings were unremarkable.

Presentation to the public hospital — 28 January 2014

60. On 28 January 2014, Mr A presented to the ED at the public hospital with left-sided chest pain. A chest X-ray and left shoulder X-ray were carried out. The chest X-ray reported:

> "Comment: Marked progression of opacification[42] since 18/2/13. This appearance suggests an occluding[43] mass in the left upper bronchus.[44] CT scan[45] recommended."

61. The left shoulder X-ray reported "a very large left upper lung mass".

[37] Champix is a medication designed to help reduce cravings and withdrawal symptoms associated with quitting smoking, and to block the effect of nicotine.
[38] Anaemia is a decrease in the number of red blood cells or haemoglobin (iron-containing oxygen-transport protein in the red blood cells) in the blood.
[39] C-reactive protein (CRP) is a marker of inflammation.
[40] A gastrointestinal endoscopy is a procedure that allows viewing of the inside of the oesophagus, stomach, and small intestine.
[41] A colonoscopy is a procedure that allows viewing of the inside of the large intestine.
[42] Opacification is a finding on X-ray that may represent consolidation, lung collapse, or mucus plugging.
[43] Occluding means obstructing.
[44] The bronchus is any of the major air passages of the lungs that diverge from the windpipe.
[45] A computed tomography (CT) scan is an X-ray test that produces cross-sectional images of the body using X-rays and a computer.

62. A CT chest scan was then undertaken. Dr B reported:

> "Comment: Occupying the majority of the left upper lobe, there is a large locally invasive malignancy with associate positive mass effect[46] and neovascularity[47] … AP window lymphadenopathy[48] is also seen. Histologic correlation is recommended."

63. An ultrasound guided left lung biopsy was carried out on 30 January 2014. Mr A was subsequently diagnosed with T3N1 squamous cell carcinoma[49] of the left upper lobe. He underwent concurrent chemotherapy and radiation therapy but, sadly, he died.

Further information — Dr C

64. Dr C stated that there is a need for clear, unambiguous communication between EDs and GPs, and suggested that TDHB could develop a process by which any test result requiring follow-up would be formally handed over to the GP by way of an amendment to the discharge summary.

Further information — TDHB

65. TDHB met with Mrs A, in a joint resolution meeting with the radiology service held in July 2015, and apologised for the delay in the diagnosis of Mr A's lung cancer.

66. TDHB noted that discharge summaries are aimed at GPs, containing test results and complex medical terminology, which can be confusing to a lay person. It has developed an electronic patient version of the discharge summary, which is shorter and more patient-centred. TDHB stated that it is continuing to work to further enhance this tool, to make it even more user-friendly for clinicians. TDHB stated that its goal is to provide "clear, unambiguous, with time and action specific written discharge instructions, to the patient and GP". TDHB also told HDC that it now also provides standardised patient discharge instruction sheets for common conditions seen in ED.

Serious and Sentinel Event Committee report 30 May 2014

67. TDHB's Serious and Sentinel Event Committee (SSEC) reviewed this case and found the following:

- Mr A's shoulder X-ray of 7 May 2013 showed a left upper lobe mass that was missed or misinterpreted, which significantly contributed to the delay in Mr A's diagnosis.

[46] Mass effect is the effect of a growing mass that results in secondary pathological effects by pushing on or displacing surrounding tissue.
[47] Neovascularisation is the formation of new functional microvascular networks with red blood cell perfusion.
[48] Lymphadenopathy is disease of the lymph nodes (organs of the lymphatic system (part of the circulatory and immune systems)).
[49] Squamous cell carcinoma is a type of cancer. "T" relates to the size of the tumour (with 3 meaning the tumour is more than 7cm, has grown into the chest wall, has grown into a main bronchus, has grown into the airways, or there are two or more separate tumour nodules in the same lobe), and "N" relates to how many lymph nodes the cancer has spread to (with 1 meaning 1–2 lymph nodes).

- There may have been communication issues between the ED and Mr A regarding follow-up with his GP and the importance of this.
- If the recommended follow-up X-ray had been ordered by Dr C (which is not TDHB's usual practice) or by Dr D, Mr A's lung tumour would have been identified and diagnosed probably in March 2013. The follow-up not occurring was a significant contributing factor to the delayed diagnosis.
- There is a responsibility for the hospital consultant or GP who received a copy of the chest X-ray result to have considered arranging a follow-up chest X-ray.
- There is a need to ensure that follow-up recommendations are carried out, with clear responsibilities.

68. SSEC recommended sharing details of Mr A's case with ED staff for learning purposes and to ensure that communication is explicit and clear to all patients regarding their follow-up. TDHB told HDC that this has occurred and that, as a result, there is a much higher level of awareness of the need for specific and detailed instructions for any ED patients regarding the need for, and when to, follow up with their GP.

69. SSEC also recommended that TDHB senior medical staff meet with GPs to discuss handover of care, and to ensure that it is coordinated, and that responsibility for ongoing management of all patients is well defined. TDHB told HDC that this has taken place, and that the responsibility to ensure good communication and coordination between ED and the patient's GP is regularly reinforced at the ED SMO meetings.

70. Lastly, SSEC recommended discussing its findings with the radiology service and asking that a review of the missed or misinterpreted mass be undertaken and reported back, with recommendations, to it. This review was completed in November 2014 (see below).

71. TDHB told HDC that following Mr A's case, ED has repeatedly reinforced with its staff the importance of clear and complete instructions for patients at discharge, and of reviewing unread test results. It stated that ED has discussed and confirmed its system for following up unread test results through meeting with district GPs and two GP liaison officers.

Further information — Dr D

72. Dr D stated that he is very sorry that Mr A did not receive a follow-up chest X-ray in February 2013. He has apologised to Mrs A for what happened, and has met with her to provide an explanation of what occurred.

73. Dr D also stated that he regrets that he did not set a reminder at the time he received the X-ray report, and is now more careful to do so, to ensure that follow-up of important results occurs. He said that Mr A's case has been a significant learning process for him, and that he has passed this learning on to the other doctors at the

medical centre at a peer review meeting. Dr D stated that no similar incidents have occurred at the medical centre since.

74. Dr D told HDC that there were a number of meetings in 2013 between GPs and the public hospital (especially the ED) in relation to test results and follow-up care. He stated that, in the last couple of years, the ED at the public hospital has significantly improved its communication of results to GPs and the passing on of responsibility for follow-up of tests.

Further information — Dr B

75. Dr B passed on her sincere condolences to Mrs A. She apologises unreservedly for any inadvertent role she may have played in relation to the delay in diagnosis of Mr A's lung cancer.

76. Dr B stated that all due diligence and care was taken by individual staff when carrying out the imaging and reviewing the imaging, within a very busy radiology department at the time. She stated that all staff have reflected on what they might have done differently, and are working hard to implement the recommendations from the reviews undertaken since this incident, to achieve further quality enhancements wherever possible within the funding available. Dr B also noted that it has been estimated that retrospective error rate among radiological examinations is approximately 30%.

77. Dr B told HDC that, on 18 July 2014, the images of Mr A's shoulder X-rays were reviewed in an internal peer review. She stated that a vague, ill-defined shadowing opacity was viewed on the frontal film within the upper zone of the left lung, but was dismissed as spurious composite shadowing because it could not be viewed clearly on both views of the shoulder and could only be partially seen. However, Dr B acknowledged that, due to the obliquity of the lateral view of the shoulder, an apical lung mass may be visible only in one view.

78. Dr B stated that she has never had a complaint previously, and has never made an error such as this previously. She said that she is struggling to believe that she could have missed an obvious mass such as this on a plain film X-ray. Dr B told HDC that she has changed her viewing practices and is now constantly aware of resizing images to ensure that she is actually seeing the entire image captured. She stated that she now adds into her shoulder X-ray reports "visualized adjacent [the other side of the chest] grossly clear" as a clear indicator that she has viewed the lung field and as a reminder to herself to re-check.

Further information — the radiology service

79. The radiology service told HDC that it discussed the IT issue with its software supplier, and is now aware that it was a known bug in the system. The bug was rectified in an upgrade in 2016.

Review November 2014

80. In November 2014, TDHB and the radiology service obtained an external review of six cases from independent radiologist Dr G. The review was initiated based on the

SSEC recommendations and concerns raised by a tertiary referral centre. This case was one of those reviewed.

81. Dr G reviewed the chest X-ray of 18 February 2013 and advised:

> "The first x-ray described the consolidations correctly; assuming pneumonia as most likely cause was not clearly supported by clinical information but it is reasonable to consider this a likely underlying cause. A follow-up x-ray was recommended. This is considered as an appropriate report and recommendation."

82. Dr G reviewed the shoulder X-ray of 7 May 2013 and stated:

> "The report of the second x-ray of the left shoulder described correctly the status of the shoulder joint but the large mass in the left upper lobe of lung was missed or misinterpreted. Under normal circumstances, this should have been seen and should have triggered further investigations, especially in the light of the comparison with the previous x-ray which showed a normal left upper lobe of the lung. A shoulder x-ray in ap and axial projection is, in principle, not diagnostic for a lung mass, but the appearance and significant interval change compared to the prior image should have raised suspicion and should have prompted a review of the previous chest x-ray. The ordering of a new chest x-ray would have been appropriate. This oversight or misinterpretation contributed to the delay of the diagnosis."

83. In regard to staffing levels on 7 May 2013, Dr G stated:

> "Three radiologists managing the workload of the entire department including a clinical meeting is considered to likely create an unsafe environment with high individual workload under time pressure which may result in lack of time to apply the appropriate accuracy in reporting. Frequent interruptions also occurred on a daily basis."

84. Dr G recommended adjusting staffing levels and planning for future staffing levels by appropriately managing leave, non-clinical time, continuing medical education (CME), and locums. He recommended recruiting staff to broaden the spectrum of subspecialty knowledge and allow for internal double reading of selected cases.

85. Dr G identified issues with communication among radiologists and clinicians, and recommended increasing the radiology service presence at TDHB meetings where images and results are discussed.

86. Although Dr G identified perception and interpretation errors as a contributing factor across the six cases he reviewed, he did not identify any systemic problems with the quality of reporting. He recommended continuing with two-monthly review conferences, with the aim of openly discussing errors.

87. In order to decrease frequent interruptions, Dr G recommended streamlining and standardising CT and MRI procedures to reduce questions from technicians,

streamlining referral processes, and rostering a single radiologist to deal with all queries.

88. Dr G identified a reluctance by radiologists to suggest further investigations, and recommended having a more proactive approach for suggesting the most appropriate imaging, and encouraging TDHB clinicians to seek advice regarding the most appropriate imaging.

89. Dr G also identified that radiologists' recommendations were not being followed, and recommended using an electronic critical alert folder[50] alongside the existing protocol for critical findings that need immediate action.

90. In order to improve IT infrastructure limitations, Dr G recommended a more integrated IT system that provides easier access to DHB data and results, and also creates the opportunity for structured internal audits.

Implementation of Dr G's review recommendations

91. The radiology service told HDC that, since November 2014, it has been reporting to SSEC on progress made towards meeting the recommendations in Dr G's report. A new management structure has been created to oversee service delivery and ensure that the radiology service is meeting expected standards, progresses recommended and agreed actions, and continues to evaluate services to achieve further service improvements. A medical radiation technologist is employed one day a week to work on further service enhancements.

92. In regard to inadequate staffing levels for the workload involved, the radiology service stated:

- Since the change of ownership, the radiology service has been focusing exclusively on the delivery of radiological services to the public health service, so there is a slightly reduced workload. There are now 7.8 full-time equivalent radiologists on the roster with a further radiologist available for casual cover, and a contracted after-hours private radiology company to manage the out-of-hours acute workload and any ad hoc requests for reporting.
- Planned leave has been set at two radiologists at any one time. A set roster for non-clinical time/CME has been established, which will be adjusted as and when required to cover planned and unplanned leave.
- It is focusing on employment of radiologists or long-term contractor arrangements rather than a cycle of locums.
- Internal job sizing is in place.

[50] A critical alert folder could have cases assigned to it and get checked twice daily by a clerical staff member, who contacts the referring clinician and seeks confirmation that the report was read and acted upon.

- The external radiology contractor provides the radiology service with an option for a second opinion for any imaging that requires greater sub-specialty experience and knowledge than current staff have.

93. As to communication issues among radiologists and clinicians, the radiology service stated:

- Weekly multidisciplinary team (MDT) meetings now take place. These meetings are given the highest priority and are not cancelled.
- A Radiology Advisory Group (RAG) has been established comprising TDHB senior clinicians and the radiology service clinicians. There are now agreed contact people for any clinical issues arising which allows for early resolution.
- A new head of department (HOD) has been appointed for the radiology service and will be attending TDHB HOD meetings.
- It is focusing on follow-up/earlier escalation to CT/MRI. If there is a suspected mass on chest X-ray, an immediate email is sent to the respiratory physician and principal radiologist, with direct communication occurring with the referrer to ensure that an urgent CT is performed. Further, if a radiologist recommends "High Tech" imaging to a GP referrer, the GP can make this referral without having to seek further specialist support.
- Short internal meetings/peer review for uncertain cases is occurring, but this needs to be formalised. The new HOD has set up a schedule of clinical audits and case reviews for all the radiology service clinical staff.
- There is improved cross-discipline communication within the radiology service, as well as improved cross-specialty communication, as a result of the change of ownership and new structure (a tripartite structure with HOD, Operation Manager, and Clinical Services Manager).

94. In regard to perception and interpretation errors, the radiology service told HDC that departmental guidelines regarding reporting of incidental lesions, including pulmonary lesions, at non-screening examinations have been formalised. The HOD has also instituted regular clinical audit and case review where errors and/or unexpected findings have been identified.

95. The radiology service stated that, in order to decrease frequent interruptions:

- There is renewed emphasis on writing standardised protocols for routine scans. This is in progress using example templates from other hospitals as an initial reference point.
- The HOD is reviewing the process for vetting referrals, and the radiology service is participating in a wider TDHB IT lead project looking at the introduction of e-referrals. TDHB advised that a recommendation for a replacement radiology information system (RIS) and picture archiving and communication system (PACS) has recently been provided to the TDHB executive management team for sign-off.

- Delegation of part of the vetting process is being considered for some modalities. This will be reviewed when the new computer system is in place.
- Protected times have been created during the morning and afternoon, where interruption is not tolerated unless absolutely critical (urgent clinical matters are always responded to). The concept of a duty radiologist is now able to be considered. Improvements have also been made in workflow efficiencies.

96. In regard to a reluctance to suggest further investigations, the radiology service stated that regular opportunity is given at weekly MDT meetings to reinforce correct imaging modalities, and it is reinforced daily in clinician-to-clinician interactions that clinicians can seek advice regarding the most appropriate imaging. This is also reinforced and facilitated by the establishment of the RAG and the increased interaction between the radiology service and TDHB as a result of the change of ownership.

97. As to radiologists' recommendations not being followed, the radiology service stated that there is ongoing discussion about the ability to create alerts through the e-referral system or whether this must wait until the new computer system is implemented. An Unread Electronic Results project has been commenced. A number of issues related to the appearance of unread electronic results referred from the community are currently in the process of being resolved. Direct communication of any significant unexpected finding with the referring clinician is continually reinforced.

98. The radiology service stated that, in order to improve IT infrastructure limitations:

- A project to analyse the two options for a new computer system has just been launched by the IT department. The new system would be more sophisticated, more user-friendly and more consistent with systems used in other radiology services across the country.
- The IT department has also developed a project brief for the migration of all other the radiology service IT systems and infrastructure into TDHB from February 2016, including merging intranets and hardware.

Responses to the provisional opinion

99. Responses to the provisional opinion were received from TDHB, the radiology service, Dr B, Dr D, and Dr C. Mrs A had no comments to make in response to the "information gathered" section of the provisional opinion. Where appropriate, responses have been incorporated into the "information gathered" section above.

100. In response to the provisional opinion, TDHB stated that it accepts that its verbal instruction to Mr A may not have been explicit enough regarding the need for him to follow up with his GP, or when he should follow up with his GP. It also acknowledges that its discharge documentation was not explicit enough in terms of advising Mr A and his GP why and when he should follow up with his GP.

101. TDHB highlighted that responsibility for follow-up of test results ordered in ED is a complex issue, and there are divergent views on the matter. However, TDHB stated

that it accepts that any expectation of handover of responsibility from an ED doctor to a GP must be clearly documented in the ED discharge summary. TDHB stated that it has acted to implement this for all ED test results where follow-up is not able to be achieved within the ED episode of care.

102. Regarding test results that become available after a patient has been discharged, TDHB noted the impracticalities of ED doctors, when next on shift, isolating themselves from the current ED patient workload they are managing, reviewing the historical diagnostic test results from patients who presented on their last shift, then adding an addendum to the discharge summaries of those patients for whom the results indicate that some further follow-up is required. Rather, TDHB considers that it is more appropriate for an ED doctor to reference the tests ordered in the discharge summary and request the GP to follow up and action results (that are not yet available at the time of discharge) as appropriate. TDHB stated:

> "We have moved now to a more formal handover of care via the patient's electronic discharge summary. The ED doctors are careful to advise patients and request in the patient's electronic discharge summary that the GP is to follow up the patient's unread test results."

103. TDHB stated that following this case it has repeatedly reinforced with ED staff the importance of clear and complete instructions at discharge, and of reviewing unread test results if available, or documenting handover of responsibility for follow-up of those test results if unavailable.

104. TDHB told HDC that currently it has a project underway to review all aspects of managing patient test results, including electronic acknowledgement by the ordering or delegated clinician. The project will inform the drafting of a new TDHB Clinical Management of Tests and Investigations policy, which will specifically encompass clinician expectations in the ED setting where delegation of responsibility to GPs or other clinicians seems the only feasible and realistic way to manage the situation and eliminate risk. TDHB stated that this will ensure appropriate communication of the delegation of responsibility for clinical follow-up, although it does not guarantee GP acceptance of the delegation.

105. In response to the provisional opinion, Dr B submitted that she honestly does not believe that she was presented with the non-magnified images, as this would be an atypical mistake for an experienced radiologist to make. Dr B said that she reported the X-ray under extraordinary circumstances, and that her equipment was far from ideal. Dr B stated:

> "Again, four years on I unreservedly apologise for any inadvertent role whatsoever that I may have played in [Mr A's] delayed cancer diagnosis. I absolutely agree that [Mr A] had the right to have services provided with reasonable care and skill by the staff involved in his care. Within the IT and work related constraints … I do not believe that I could have done any better or differently at that time. Services were provided by me with care and skill."

106. In response to the provisional opinion, the radiology service told HDC that the management structure and practice environment of the radiology service have been overhauled since TDHB took over full ownership of the radiology service. the radiology service is now able to access wider TDHB resources including HR, risk management, and chief medical advisor and director of nursing advice, to provide support in all aspects of daily operations. The radiology service believes that the practice environment that exists today is very different from the one that existed in 2013. The radiology service stated: "We would also like to again apologise to [the family] for those actions of ours which contributed to the delayed diagnosis of [Mr A's] lung tumour."

107. Dr D stated:

> "Once again, I am sorry that I did not organize a follow up X-ray for [Mr A] in February 2013 and regret this omission. As mentioned previously, I now make sure to set myself reminders on [the computer system] for all significantly abnormal results, including tests requested by other practitioners that are copied to me. I have discussed this at my Peer Review Group, and with the other doctors in my practice so we are all aware of this."

108. Dr C stated: "While it is difficult to have one's care scrutinised, I agree with the … assessments. I have taken steps to adjust my practice as a direct result, and feel this has improved my patient care."

Opinion: Dr B — breach

109. Under Right 4(1) of the Code, Mr A had the right to have services provided with reasonable care and skill by the staff involved in his care.

110. Mr A had a complex medical history and was a long-term cigarette smoker. An X-ray taken on 18 February 2013 had reported: "There is a dense pneumonic consolidation medially in the left upper lobe and in the lingula." On 7 May 2013, Mr A presented to the accident and medical clinic and was referred for a left shoulder X-ray. The referral stated: "[W]alked into [object] yesterday with left shoulder/upper outer arm and now cannot abduct or flex the shoulder." Standard X-ray imaging was undertaken by a radiographer at the radiology service, showing two views of the shoulder.

Reporting of shoulder X-ray

111. Dr B was the radiologist who reported on Mr A's left shoulder X-ray. While Dr B accurately reported on Mr A's shoulder injury, she failed to identify a mass in the left upper lobe of the lung, visible in the first of the two views taken.

112. My expert advisor, radiologist Dr Mark Leadbitter, conducted a review of the X-ray of 7 May 2013,[51] and his report stated: "[There is a] [m]ass lesion at the apex of the left lung with possible involvement of the third rib. Bronchogenic carcinoma[52] is the most likely possibility in a person of this age."

113. Dr B stated that the standard shoulder X-ray imaging performed was not the imaging that would have been used specifically to assess for the presence of lung cancer, but acknowledged that radiologists are trained always to look for incidental findings. She also told HDC that, in July 2014, an internal peer review of the X-ray found a vague, ill-defined shadowing opacity in the upper zone of the left lung, but dismissed this as spurious composite shadowing because it could not be viewed clearly on both views of the shoulder and could only be partially seen. However, Dr B acknowledged that, due to the obliquity of the lateral view of the shoulder, an apical lung mass may be visible only in one view.

114. The radiology service obtained an external review of this case from Dr G. Dr G considered that, under normal circumstances, the large mass in the left upper lobe of the lung should have been seen and triggered further investigations. ACC obtained expert advice and were advised that detection of the left upper zone pathology should reasonably have been made.

115. After reviewing further documentation related to this complaint, Dr Leadbitter advised:

> "On the images that I reviewed, I would expect the majority of specialist Radiologists to detect the left apical lung mass as I did. I therefore consider this to be a moderate departure from the expected standard of care."

116. Dr B told HDC that she may have been looking at inappropriately magnified images of the shoulder at the time of reporting, due to an intermittent IT issue where the first image initially displayed correctly, but after the radiologist scrolled through the other images and returned to the first image, the first image was auto-magnified, cutting off part of the image. Dr B stated that, if the IT issue occurred in this case, she would have had bare seconds to register the non-magnified image, making it difficult, if not impossible, for her to detect the left upper lobe lung mass. She also said that she does not believe she would have picked up the fact that the images were auto-magnified, as she is accustomed to seeing a wide variety of images and the magnified view looks like a good coned view of the shoulder joint.

117. Dr Leadbitter advised:

> "The abnormality at the left lung apex reaches the edge of the lung field on the AP view. This is not a subtle abnormality.

[51] Initially, Dr Leadbitter was not provided with any information about Mr A's care, other than the X-ray and referral information.
[52] Lung cancer.

> If the image was magnified such that none of the lung field was visible at all, then the lung mass may not have been visible. It is usual that Radiologists expect to see some of the lung field on this view of the shoulder, as the medial end of the clavicle is usually visible on such a view.
>
> … [I]f this single image was viewed I would expect the lung lesion to be detected by a Consultant Radiologist, even if the image was subsequently magnified on further image review."

118. I am unable to make a finding as to whether the IT issue occurred at the time Dr B reported on this X-ray, given that the IT issue was not discovered until two years later and there is no evidence that it occurred at the time this X-ray was read. Even if the IT issue did occur, Dr B still had an initial opportunity to identify the lung mass, and should have realised that the later image was magnified.

119. Dr B also told HDC that, at the time of these events, the working environment at the radiology service, of low staff levels with a sustained high clinical workload and frequent interruptions, was unsafe. She stated that this was a contributing factor to the error, and may have impacted on her cognitive perceptive abilities that day.

120. Dr Leadbitter advised that clinical workload and shortcomings of the reporting room environment may be relevant to radiologist performance. However, as above, he concluded that he would expect the majority of specialist radiologists to detect the lung mass.

Conclusion

121. In her radiology report of 7 May 2013, Dr B failed to identify the left upper lobe lung mass. Despite the potential IT issue and the workplace circumstances that existed at the time, in my view, this abnormality should have been identified and reported on. By failing to do this, Dr B did not provide services to Mr A with reasonable care and skill and, therefore, breached Right 4(1) of the Code.

Opinion: the radiology service — adverse comment

122. The radiology service may be directly liable for the failures in the services it provides. Radiology clinics have a responsibility for ensuring that consumers receive an appropriate standard of care. Accordingly, clinics need to have in place adequate systems and procedures to support staff.

X-ray of 18 February 2013

Reporting of X-ray

123. Mr A had a complex medical history and was a long-term cigarette smoker. On 18 February 2013, he presented to the ED at the public hospital. Dr C referred him for a chest X-ray for: "Chest pain and [shortness of breath]. [Rule out] pneumothorax." Mr A's smoking history was not noted on the referral. Dr E reported: "There is a dense

pneumonic consolidation medially in the left upper lobe and in the lingula … Follow-up imaging in 10–14 days to ensure resolution is recommended."

124. The radiology service told HDC that the chest X-ray was interpreted correctly. It obtained an external review of this case from Dr G. Dr G considered that the consolidations were described correctly, and that it was reasonable to consider pneumonia as a likely underlying cause. He noted that a follow-up X-ray was recommended. Dr G concluded that the report and recommendation were appropriate.

125. My expert advisor, radiologist Dr Mark Leadbitter, advised that it was reasonable in the circumstances to attribute the consolidation to pneumonia, and concluded that the report is consistent with an appropriate standard of care.

126. In my view, the X-ray report of 18 February 2013 was interpreted reasonably in the circumstances. While the report could have been more suspicious of a mass in the left upper lobe, it was reasonable to attribute the consolidations to pneumonia and recommend a follow-up X-ray to ensure resolution.

Follow-up X-ray

127. The radiology service stated that a copy of an X-ray report is not sent to the patient unless this has been specifically requested on the referral form. The radiology service told HDC that the ultimate responsibility to act on a radiology report lies with the referrer and/or receiver of the report. TDHB stated that repeat X-rays are not booked by the radiology service because, if the patient's symptoms improve after treatment, a follow-up X-ray may not be required.

128. I consider that it was reasonable in the circumstances for the radiology service not to have sent a copy of the report to Mr A, as this was not its responsibility, and not to have had a system in place to alert it if the recommended follow-up X-ray was not ordered. The radiology service sent a copy of the report to Dr C and Dr D, for them to action as appropriate.

X-ray of 7 May 2013

IT issue

129. At the time of these events, the radiology service may have been experiencing an IT issue relating to the display of images. In June 2015, it was discovered that there was a random, transient issue with auto-magnification of images for plain film X-rays affecting two workstations. It is not known when this issue began, and it was not known to staff in May 2013. When the issue occurred, the first image initially displayed correctly, but after the radiologist scrolled through the other images and returned to the first image, the first image was auto-magnified, cutting off part of the image. The radiology service told HDC that it discussed the IT issue with its software supplier, and is now aware that it was a known bug in the system. The bug was rectified in an upgrade in 2016.

130. I am concerned that there was an issue with the radiology service's image display software, and about the impact this may have had on an unknown number of X-ray reports. It was the radiology service's responsibility to ensure that its software was

functioning correctly, but I acknowledge that it was not aware of this issue in 2013, and that it was difficult to discover, given that it affected only two workstations and was intermittent.

Staffing and environmental issues

131. The radiology service told HDC that on the day of Dr B's review, the department workload was high, and that Dr B had a very high individual workload. It concluded that there were inadequate radiologist resources available that day relative to the workload experienced. It also acknowledged potential environmental issues such as staff interruptions.

132. Dr B stated that the environment in which she was working at the time was unsafe and was a contributing factor to the error, and may have impacted on her cognitive perceptive abilities that day.

133. Dr G also stated in his review that the level of understaffing was considered likely to create an unsafe environment with high individual workload under time pressure, "which may result in a lack of time to apply the appropriate accuracy in reporting".

134. I note that the radiology service has since made a number of changes to its practice, including adjusting staffing levels. I consider these changes to be both necessary and appropriate in the circumstances.

Opinion: Dr C — adverse comment

Clinical history on X-ray referral

135. Mr A had a complex medical history and was a long-term cigarette smoker. On 18 February 2013, he presented to the ED at the public hospital. Dr C referred him for a chest X-ray for: "Chest pain and [shortness of breath]. [Rule out] pneumothorax." Dr C recorded in the clinical records that Mr A had a smoking history, but did not record details of this, such as the duration and frequency of smoking. Mr A's smoking history was not noted on the X-ray referral.

136. Mrs A stated that, because Mr A's smoking history was not noted, Dr C did not provide an adequate clinical history on the referral. Dr C and TDHB told HDC that a patient's smoking history is not generally provided with an X-ray request.

137. My expert advisor, emergency medicine specialist Dr Tom Jerram, advised that it is not standard practice to document a smoking history on a chest X-ray referral in the ED, although it would be helpful to do so in many cases. He did not consider Dr C's failure to do so to be a departure from the standard of care. Nonetheless, Dr Jerram advised that the failure to document (and possibly consider) a full smoking history was a minor departure from the standard of care.

138. I note Dr Jerram's advice. Prudence would suggest, however, that a long-term history of smoking would be useful information for a chest X-ray referral when chest pain and shortness of breath are presenting symptoms. I am critical that Dr C did not record the details of Mr A's smoking history in the clinical records. I reiterate the importance of comprehensive documentation.

Discharge

139. Dr C told HDC that Mr A presented with symptoms concerning for pneumonia, and the chest X-ray confirmed this diagnosis. Dr C recommended that Mr A be admitted to the ward, but Mr A declined. Mr A was therefore discharged with a prescription for antibiotics and pain medication. On discharge, Dr C told Mr A to follow up with his GP, but did not specify a timeframe for this. Mr A was provided with a copy of his discharge summary, which stated: "Please return to the ED if symptoms worsen. Follow up with your GP."

140. Mrs A told HDC that Dr C's discharge instructions were unclear. She also queried whether, on discharge, Dr C should have recommended a follow-up chest X-ray, given Mr A's smoking history.

141. Dr C told HDC that the discharge summary was appropriate, and that repeat X-rays are done on a case-by-case basis after follow-up. TDHB told HDC that Mr A may not have understood that Dr C expected him to follow up with his GP, and stated that this may have been alleviated if Dr C had given a specific timeframe around the follow-up request. TDHB also said that, with pneumonia, if the patient's symptoms improve after treatment, then a follow-up X-ray may not be required.

142. Dr Jerram advised that communication and handover of care to the GP should be clear and unambiguous, with time- and action-specific written discharge instructions to the patient and GP. He stated that, in this case, a clear plan for GP review at a specified time (2–4 weeks) should have been made, to consider follow-up imaging and taking into account that Mr A had other potentially concerning features for lung cancer (such as a chronic cough). Dr Jerram advised that the discharge summary had good instructions, other than the lack of a specific timeframe for GP follow-up. He concluded that Dr C's failure to give a specific timeframe for GP follow-up constituted a minor departure from the standard of care.

143. Dr C should have provided more specific instructions on discharge, and I am critical that he did not do so. As well as giving a timeframe for GP follow-up, it would have been beneficial if Dr C had explained his rationale for recommending GP follow-up to Mr A (i.e., regardless of symptoms and so that the GP could assess whether further imaging was required). I consider that it was reasonable that, on discharge, Dr C did not recommend a follow-up X-ray, as he did not have the radiology report at that time and he had recommended GP follow-up (although without a specific timeframe).

Follow-up X-ray

144. Dr C and Dr D both received the chest X-ray report, which recommended a follow-up X-ray in 10–14 days' time, but neither took any action in respect of it.

145. Dr C stated that, at TDHB, follow-up X-rays are usually handled by the GP, and it would be very unusual for an ED clinician to order a follow-up X-ray at 10–14 days. He stated that this case was most appropriately followed up with a GP.

146. TDHB stated that test results reported after an ED patient's discharge are followed up by both the ED SMO and the patient's GP, depending on the action required. It said that repeat X-rays are not booked by ED doctors at the time of review of the radiology report, as they may not be required. TDHB told HDC that it would have been reasonable to expect that Mr A did not require another chest X-ray to confirm resolution of pneumonia if, on follow-up, his pneumonia had cleared clinically. Therefore, Dr C would not have felt it necessary to contact Mr A or his GP to ensure that another chest X-ray was taken.

147. Dr Jerram acknowledged that the interface between EDs and GPs in terms of responsibility for following up results is "perpetually challenging". He stated that while, in general, the ordering clinician is responsible for following up a test result, this is not so in the ED when the result does not immediately affect the episode of care. He stated that best practice would have been for Dr C to have ensured that Dr D had read the radiology report and planned to act on it, but his failure to take any action after receiving the X-ray report does not constitute a departure from the standard of care.

148. I am concerned that the X-ray report was not acted on. However, I accept Dr Jerram's advice that it was reasonable for Dr C not to have taken any action in respect of it, and acknowledge that ED doctors are in a unique position in terms of being responsible for following up the results of tests they order — given that their remit is short-term care, they are not best placed to provide ongoing longer-term care. Nonetheless, while it is not always appropriate for ED doctors to follow up these tests, they need to be confident that someone else is going to do so, and there must be clarity in the system as to who will. In my view, Dr C's communication with Dr D about follow-up could have been improved, to ensure coordination of care.

Opinion: Taranaki District Health Board — breach

149. District health boards are responsible for the operation of the clinical services they provide, and are responsible for any service failures.

150. Dr C received the chest X-ray report of 18 February 2013, which recommended a follow-up X-ray in 10–14 days' time, but did not take any action in respect of it.

151. At the time of these events, TDHB had a policy in place regarding the follow-up of test results in the ED and handover of care to GPs as follows:

> "ED SMOs review all of the laboratory and radiology results that are requested in the department during their shifts. They also complete an EDS for each patient primarily seen during their shifts. Every ED patient's diagnostic test results and

> EDS are sent electronically to the patient's GP. Results reported after an ED patient's discharge … are followed up by both the ED SMO and the patient's GP, depending on the action required."

152. For example, TDHB said that, with pneumonia, if the patient's symptoms improve after treatment, then a follow-up X-ray may not be required. Thus, repeat X-rays are not booked by ED doctors at the time of review of the radiology report. TDHB told HDC that it would have been reasonable to expect that Mr A did not require another chest X-ray to confirm resolution of pneumonia if, on follow-up, his pneumonia had cleared clinically. In response to the provisional opinion, TDHB stated that it accepts that any expectation of handover of responsibility from an ED doctor to a GP must be clearly documented in the ED discharge summary.

153. My expert advisor, emergency medicine specialist Dr Tom Jerram, acknowledged that the interface between EDs and GPs in terms of responsibility for following up results is "perpetually challenging". He stated that while, in general, the ordering clinician is responsible for following up a test result, this is not so in the ED when the result does not immediately affect the episode of care. He identified the "breakdown of communication between Emergency Medicine and General Practice" to be the core issue in this case.

154. Dr C stated that there is a need for clear, unambiguous communication between EDs and GPs, and suggested that TDHB could develop a process by which any test result requiring follow-up would be formally handed over to the GP by way of an amendment to the discharge summary.

155. Dr Jerram advised:

> "A process by which any test result which required follow up was formally handed over to the GP (such as by an amendment to the electronic discharge summary) would have been useful in this case."

156. Every day, numerous consumers are discharged from EDs all over New Zealand. It is concerning to me that both my expert advisors consider that the interface between EDs and GPs is a challenge. The TDHB process in this case was not clear as to who had responsibility for following up the result of Mr A's X-ray. However, the understanding was that the responsibility for that did not lie with the ED clinician who ordered the test. In that situation, there should have been an explicit and documented process that provided clarity to both the patient and the ED clinician as to who would be responsible for reviewing and following up the test. The basic system principle is clear — the person ordering the test must follow up, or know by whom and how in the system it will be. This is true for all scenarios involving multiple providers — individual or services. As I have commented in a previous case,[53] TDHB did not have a clear, effective, and formalised system in place for the reporting and following up of test results. I would also expect that such a system would include a policy requiring the clinician to instruct the patient leaving the ED to follow up any outstanding test

[53] See decision 12HDC00112, available at www.hdc.org.nz.

result with an identified provider, normally his or her GP. In my view, TDHB did not provide services to Mr A with reasonable care and skill, and breached Right 4(1) of the Code.

157. TDHB told HDC that senior medical staff have met with GPs to discuss handover of care to ensure that it is coordinated, and that responsibility for ongoing management of all patients is well defined. It also stated that the responsibility to ensure good communication and coordination between ED and the patient's GP is regularly reinforced at the ED SMO meetings. TDHB has also developed an electronic patient version of the discharge summary, which is shorter and more patient-centred. TDHB stated that it is continuing work to further enhance this tool, to make it even more user-friendly for clinicians.

158. In response to the provisional opinion, TDHB advised that currently it has a project underway to review all aspects of managing patient test results, including electronic acknowledgement by the ordering or delegated clinician. The project will inform the drafting of a new TDHB Clinical Management of Tests and Investigations policy, which will specifically encompass clinician expectations in the ED setting where delegation of responsibility to GPs or other clinicians seems the only feasible and realistic way to manage the situation and eliminate risk. I acknowledge the work that TDHB has undertaken to address this issue.

Opinion: Dr D — adverse comment

159. Mr A had a complex medical history and was a long-term cigarette smoker. On 18 February 2013, he presented to the ED at the public hospital. Dr C referred him for a chest X-ray, diagnosed him with pneumonia, and then discharged him. Mr A's discharge summary, which was sent to Dr D, stated: "Please return to the ED if symptoms worsen. Follow up with your GP."

160. Dr C and Dr D both received the chest X-ray report, which recommended a follow-up X-ray in 10–14 days' time, but neither took any action in respect of it. Dr D stated that it is likely that he would have presumed that the ED, as the requestor of the X-ray, would arrange the recommended follow-up imaging. He stated that normal practice is for the requesting doctor to arrange follow-up of any abnormal test result, including X-ray findings.

161. Mr A did not present to Dr D for follow-up of his pneumonia, as recommended, but presented on 17 April 2013 to obtain prescriptions for his usual medications. Dr D did not notice that Mr A had not had the recommended follow-up chest X-ray. On 11 October 2013, Mr A presented to Dr D with weight loss and sweating. Since he had last seen him, Mr A had presented twice to the accident and medical clinic, for a shoulder injury and with a chesty cough. Dr D did not notice that Mr A had not had the recommended follow-up chest X-ray.

162. Dr D stated that he is not sure why he did not set a reminder in the computer system when he received the chest X-ray report, so that he would be aware if the expected follow-up chest X-ray results were not received in a reasonable timeframe. He acknowledged that, as a GP, he has a secondary responsibility to make sure that significant abnormal results received by him, but requested by someone else, are acted upon. In the circumstances of a patient having had a presentation to ED (rather than, for example, longer-term input from another medical specialist), GPs should have a lower threshold for taking responsibility for acting upon abnormal results or recommendations made in investigation reports ordered by ED clinicians.

163. My expert advisor, general practitioner Dr David Maplesden, advised that this case illustrates the lack of clarity surrounding the handling of results ordered by secondary care providers with copies sent to primary care. He stated:

> "I am mildly critical that [Dr D] was not more proactive in confirming his assumption that the ED [SMO] would be organising the recommended follow-up chest X-ray (particularly as there was no mention in the ED discharge summary of the need for such follow-up). If [Dr D] was assuming another clinician was ordering the recommended test, and noting the result was somewhat important given [Mr A's] increased risk of lung cancer, it would have been prudent for him to use a 'reminder' system so he would be aware if the expected result had not been received within a reasonable time frame (in this case six weeks)."

164. I am concerned that the X-ray report was not acted on. Dr D should have been more proactive in confirming his assumption that Dr C would be acting on it, and I am critical that he did not do so. While it is usual practice that the ordering clinician is responsible for following up a test result, ED doctors are in a unique position, and it is not always appropriate for them to follow up these tests (although they should inform GPs when they are handing over responsibility for follow-up). I am also concerned that Dr D did not set a reminder, to alert him that the follow-up X-ray had not been carried out. Mr A's subsequent presentations to Dr D were missed opportunities for Dr D to order the follow-up X-ray, particularly the presentation in October 2013.

Recommendations

165. I recommend that Dr B:

a) Have an independent radiologist peer perform a review of a random selection of her reports completed in the last 12 months, and report back to HDC on the result of the review, within six months of the date of this report.
b) Provide a written apology to Mrs A. The apology should be sent to HDC within three weeks of the date of this report, for forwarding to Mrs A.

166. I recommend that TDHB:

a) Review its ED policy to ensure that there is a clear process for the handover of care from ED to GPs, including follow-up of tests and X-rays ordered in ED, and report back to HDC on this within six months of the date of this report.
b) Provide a written apology to Mrs A. The apology should be sent to HDC within three weeks of the date of this report, for forwarding to Mrs A.

167. I recommend that the National CMO Group work to put in place clear practice guidelines regarding the interface between emergency departments and general practitioners in relation to follow-up of test results, within all DHBs. A report back on the outcome of this recommendation should be provided to HDC by the Chair of the National CMO Group within six months of the date of this report. The National CMO Group has undertaken to comply with this recommendation.

Follow-up actions

168. A copy of this report with details identifying the parties removed, except the experts who advised on this case and Taranaki DHB, will be sent to the Medical Council of New Zealand and the Royal Australian and New Zealand College of Radiologists, and they will be advised of Dr B's name.

169. A copy of this report with details identifying the parties removed, except the experts who advised on this case and Taranaki DHB, will be sent to the ACC, the Health Quality and Safety Commission, the Chair of the National CMO Group, the Australasian College for Emergency Medicine, the Royal New Zealand College of General Practitioners, and Technical Advisory Services, and placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.

Appendix A: Independent radiology advice to the Commissioner

Radiologist Dr Mark Leadbitter conducted a blind review of the shoulder X-ray of 7 May 2013 and reported:

"**Opinion: Plain X-ray left shoulder 7/5/13**

Indication:
'Walked into [object] yesterday with left shoulder/upper outer arm and now cannot abduct or flex the shoulder.'

Findings:
2 views have been taken of the left shoulder at the radiology service.

There is minor bony sclerosis in the region of the greater tuberosity of the humerus. The glenohumeral and acromioclavicular joints are unremarkable, no fracture detected.

There is a relatively large mass lesion at the left lung apex, and there is subtle loss of definition of the medial cortex of the left third rib. No bony destruction elsewhere.

Conclusion:
No bony injury.

Mass lesion at the apex of the left lung with possible involvement of the third rib. Bronchogenic carcinoma is the most likely possibility in a person of this age."

Dr Leadbitter then reviewed relevant documentation and provided the following expert advice:

"**Opinion: Plan X-ray left shoulder 7/5/13**
I have been provided with the written response of [Dr B] to HDC dated 3/9/15.

[Dr B] makes several points in relation to her interpretation of the left shoulder x-ray dated 7/5/13:

- Shoulder x-rays are not taken with the intention of demonstrating the lungs.
- The lung mass was not clearly seen on both views.
- 'Low staff levels with high clinical workload, and frequent interruptions are noted as contributory factors.'
- IT image display issues such that 'magnification of the shoulder view appears to have precluded complete visualization of the entire left lung field'.

My Advice

- Radiologists are trained to always look for incidental findings on all imaging studies, and recommend follow up or further imaging if required.
- Because of the obliquity of the lateral view of the shoulder, an apical lung mass may only be visible in one view.
- Workplace issues such as clinical workload and shortcomings of the reporting room environment may well be relevant to Radiologist performance.
- I can only comment on the images as they were provided to me. If [Dr B] was looking at inappropriately magnified images of the shoulder at the time of reporting them, then the left apical lung mass may or may not have been visible but I cannot speculate on this.

On the images that I reviewed, I would expect the majority of specialist Radiologists to detect the left apical lung mass as I did.

I therefore consider this to be a moderate departure from the expected standard of care."

Dr Leadbitter later provided the following further expert advice:

"Specific Issue Relating to Image Magnification:

Regarding the interpretation of [Mr A's] shoulder X-rays from 7/5/13.

The abnormality at the left lung apex reaches the edge of the lung field on the AP view. This is **not** a subtle abnormality.

If the image was magnified such that none of the lung field was visible at all, then the lung mass may not have been visible. It is usual that Radiologists expect to see some of the lung field on this view of the shoulder, as the medial end of the clavicle is usually visible on such a view.

[Dr B] states that she is 'doubtful that I had the entire image to report on due to the magnification error'.

It is not for me to speculate on what [Dr B] may or may not have seen at the time she interpreted these images as I stated in my letter 29/3/16. However, as I have said, if this single image was viewed I would expect the lung lesion to be detected by a Consultant Radiologist, even if the image was subsequently magnified on further image review as has been postulated by [TDHB]."

In regard to the chest X-ray of 18 February 2013, Dr Leadbitter advised:

"**Materials Reviewed:**
Chest X-ray (PA only) dated 18/2/13

Radiology report by [Dr E] relating to the Chest X-Ray from 18/2/13

My Opinion Of The Chest X-ray:
Clinical information provided: 'chest pain and sob. r/o pneumothorax'

There are areas of dense opacity in the left upper lobe and in the left basal region. The opacity in the left upper lobe is moderately well defined, and posterior in location. There is no cavitation, no well-defined nodules elsewhere, and no pleural fluid.

The heart size and contour are normal. No destructive bony lesion seen.

[Dr E's] Report:
He has attributed the consolidation to pneumonia, which is reasonable in the circumstances. While the request form does not mention fever or signs of a systemic illness, clinical details are often deficient on Imaging request forms from Emergency Departments. Also chest pain is a common clinical feature of pneumonia.

[Dr E] has recommended what would be considered to be early follow-up for this situation, presumably because of his concern about the extent of the lung abnormality.

Conclusion
I consider [Dr E's] report to be a reasonable one, and consistent with an appropriate standard of care.

It is the clinician's primary responsibility to place the imaging findings in the clinical context of the patient's history of the presenting complaint, laboratory test results and relevant past medical history. It is also their responsibility to determine and arrange follow-up.

Please do not hesitate to contact me if any further advice is required in this case."

Appendix B: Independent emergency medicine advice to the Commissioner

The following expert advice was obtained from emergency medicine specialist Dr Tom Jerram:

"Thank you for your request to review the above complaint.

In doing so I have reviewed the documents sent to me including:

— Your letter dated 27 January 2016

— Letter of complaint from [Mrs A]

— Responses from [Dr C] and Taranaki DHB

— Clinical notes relevant to the complaint as provided

I am currently a Fellow of the Australasian College for Emergency Medicine since 2011 and work full time as an Emergency Medicine Specialist at Nelson Hospital Emergency Department. I am also a Senior Clinical Lecturer with the Otago University Christchurch School of Medicine. I have read the HDC guidelines for expert advisors. I have reviewed the persons and entities in this case, and can see no conflicts of interest.

Referral instructions
I have been asked by the Commissioner to give an opinion on the care provided, including the following issues:

1. Please comment on the adequacy of the information provided to [the radiology service] by [Dr C] in his request for a chest X ray

2. Given that the formal radiology report recommended follow-up imaging, whose responsibility would you consider it was to organise this?

3. Please comment on the coordination of care between [Dr C] and [Mr A's] GP, [Dr D], including the adequacy of the instructions provided in the discharge summary

4. Any further comments/recommendations

Case summary
On 18 February [Mr A] presented to [the public hospital's] Emergency Department complaining of shortness of breath and pleuritic chest pain (pain which is worsened with breathing). He arrived at 17:45 and was assessed by the triage nurse. They noted that he was tachypnoeic (had a fast breathing rate) at 30 per minute, was in mild pain, and had otherwise normal vital signs, although no temperature was done. It was also noted that he was a smoker. He was triaged as ATS category 3, and appears to have been moved to a cubicle by 1827, when he had a further nursing assessment. This makes note that he developed left sided

chest pain which was pleuritic in nature, and which came on [while doing physical work]. It is also mentioned that he is short of breath, clammy and wheezy since the onset of pain.

He had another set of observations at this time, in which he was still tachypnoeic at 26 breaths per minute, but again with otherwise normal vital signs (again, there was no temperature taken).

Comment was made at this point that he was 'visibly short of breath. Sitting upright'.

He appears to have been seen by [Dr C] at around 19:20, and had blood tests and a chest X-ray.

[Dr C's] note is timed 1930. He notes that [Mr A] was complaining of left anterior chest pain that started several hours ago. He describes pleuritic pain, and notes that [Mr A] had felt 'ill' since the day before. He made note of a chronic cough which was not altered today, and states that there were no other symptoms. There is no mention of current medications, past medical history, smoking or social histories in this note. On examination he states [Mr A] was in mild pain/ distress. He states 'HEENTwnl'. This is a non standard shorthand acronym, but my guess is that it means th at head eyes ear nose throat are within normal limits. What this actually signifies is unclear. He documented that the heart was clear, and that there were lung rales over left lower lung (crackling noises which are suggestive of the presence of fluid within the lung). The abdomen was documented as benign.

He notes a normal ECG, and a chest X ray showing 'LLL and perihilar infiltrates'.

There are cut/pasted blood results which show a mildly elevated white cell and neutrophil count. There is a single troponin I value which is above the reference range for a normal population (21ng/L, normal 0–13 ng/L).

[Mr A] was treated with nebulisers and oral pain relief.

[Dr C] writes a medical decision making note in which he states that the symptoms and workup are consistent with pneumonia. He does not suspect ACS (although a single troponin was done, and was above the 99th centile for a normal population). He states that [Mr A] feels better with pain meds, is 'very motivated for discharge home', and refuses admission.

He is discharged with a 10 day course of antibiotics (augmentin and roxithromycin), 40 codeine phosphate tablets, and 40 ibuprofen tablets.

In his last documented set of observations in ED at 20:20 he was hypoxic with an oxygen saturation of 89%, presumably on room air. His saturations had previously been recorded at 98%. There was no respiratory rate done at this time. He did not have a documented temperature during the ED visit as far as I can tell

The documented follow up advice is to return to the ED if symptoms worsen, and to follow up with GP (no time frame for this is given). The formal radiology report identified a dense pneumonic consolidation in the left upper lung and lingual, and recommended follow up imaging in 10–14 days to ensure resolution.

Unfortunately this imaging was never done, and [Mr A] presented nearly a year later, on 28 January 2014 with chest pain, and was found to have a large tumour involving most of the left upper lobe, and infiltrating the chest wall. This was subsequently confirmed to be small cell lung carcinoma. I am sorry to hear that [Mr A] subsequently passed away as a result of his cancer.

In answer to your specific questions

1. Please comment on the adequacy of the information provided to [the radiology service] by [Dr C] in his request for a chest X ray.

I do not have the X ray request written by [Dr C] available to me in the documentation provided, so it is hard to make a definitive comment on this.

Unfortunately, the formal radiology report does not include formal referral instructions.

According to your referral letter, the chest X ray was ordered to exclude pneumothorax. It is also clear from the documentation available that there was no smoking history provided on the request form. As stated by both the DHB and [Dr C], a smoking history would not necessarily be documented on a chest x- ray referral form in the Emergency Department, indeed it is probably the standard practice in New Zealand at this time not to do so. It would however have been helpful in this, and many other cases. A nationwide move towards electronic radiology ordering will improve information such as this available to radiologists. [Dr C] states that 'I do not routinely inform radiology of a patient's smoking history, other than to document this in the medical chart'.

Unfortunately, he did not document this specifically, other than the electronically generated 'Smoking Information' box. This gives no details of duration or frequency of smoking history, both of which are important in a patient such as [Mr A]. For example, a patient with a 40 year history of smoking a pack a day would be at significantly higher risk of cancer and chronic lung disease than a patient who smoked on rare occasions. It is not clear from the notes whether [Dr C] considered the significance of the smoking history.

Overall I would consider this failure to document (and possibly consider) a full smoking history only a minor departure from the standard of care. I would not consider the failure to document smoking history on the X-ray request form a departure from the standard of care.

2. Given that the formal radiology report recommended follow up imaging, whose responsibility would you consider it was to organise this?

The interface between Emergency Medicine and General Practitioners in terms of following up results is perpetually challenging. In general, the responsibility for following up a test result should be on the ordering clinician. This can be difficult in Emergency Departments. ED clinicians work shifts, with transient episodes of care, and no linear follow up relationship with patients. Follow-up of results which would have a short term consequence, and clearly relate to the episode of care, are the responsibility of Emergency Medicine. This includes things like missed fractures on x-ray report, and microbiology results showing bacteria resistant to prescribed treatment. In an episode such [Mr A's], it would be very unusual for a

New Zealand Emergency Medicine clinician to order a follow up X ray at 10–14 days, with this generally being deferred to the General Practitioner. Among the reasons for this is that if another X ray had been ordered by [Dr C], he would then be expected to follow this up. There is no provision in New Zealand Emergency Departments for this sort of follow up care, and most are incredibly stretched dealing with acute workloads. The key to this is good communication between the ED and the GP — an amendment to the discharge summary regarding the X ray report would have been useful (I will expand on this in my answer to question 3). [Dr C] also states that 'there are no current medical guidelines to support follow up chest X ray at 2 weeks to ensure pneumonia resolution, and repeat X rays are done on a case by case basis'. Unfortunately, this is not entirely accurate. The New Zealand BPAC guideline (2012) states the following

Adults should ideally be reviewed six weeks after treatment. In patients with poor clinical recovery, chest x-ray should be considered to rule out underlying malignancy. People with pneumonia aged over 50 years who smoke should also be assessed for the possibility of underlying malignancies. This includes assessment for any clinical features of lung cancer, arranging a chest x-ray once antibiotic treatment has been initiated and a follow-up x-ray at six weeks. Smoking cessation advice should be offered.

UK guidelines have similar advice around older smokers with radiologic pneumonia, and rate of lung cancer in follow up films of patients aged over 50 appears to be around 2.8%. *Tang KL et al. Incidence, correlates, and chest radiographic yield of new lung cancer diagnosis in 3398 patients with pneumonia. Arch Intern Med 2011 Jul 11; 171:1193*

(http://dx.doi.org/10.1001/archinternmed.2011.155)

Given all of this, the 2 week time frame as suggested on the formal report is somewhat arbitrary, however a clear plan for GP review at a specified time (ie 2–4 weeks), including consideration of follow up imaging should have been made, independent of the radiology report. [Mr A] did have other potentially concerning features for lung cancer noted on his visit, predominantly the chronic cough. [Dr C] did ask the patient to follow up with his GP on the discharge letter (although without a specified time frame). Overall, given that the discharge summary did suggest follow up with the General Practitioner, I would consider this only a minor departure from the standard of care on [Dr C's] part.

3. Please comment on the coordination of care between [Dr C] and [Mr A's] GP, [Dr D], including the adequacy of the instructions provided in the discharge summary.

The breakdown of communication between Emergency Medicine and General Practice is the core issue in the unfortunate outcome in this case. The Emergency Department discharge summary had good instructions, with one important exception; the lack of a specific time frame in which to seek review by the GP.

Presumably, [Mr A] had clinically improved with regards to his pneumonia, and didn't feel the need to seek GP review. If it had been clear that he needed to see his GP for review regardless of his current symptoms, his malignancy may have

been picked up sooner. This may or may not have had a significant impact on the final outcome. I would consider this lack of a time specific follow up plan in this case a minor breach of the standard of care. The formal radiology report suggesting a follow up X ray was reviewed by [Dr C], and it is likely that he believed that [Mr A] would follow this up with his GP. His GP would have been sent a copy of the X ray report, however [Mr A] does not appear to have seen his GP again until May, when an x-ray of his shoulder was ordered. Best practice would be to close the loop by ensuring the GP had read the formal report, and planned to act on it. This can be easily done with an electronic amendment to the discharge summary or similar. I do not think this failure to further follow up after the formal X ray report constitutes a clear breach of the standard of care on the part of [Dr C] however, unless he did not also ask [Mr A] verbally to follow up with his GP on discharge. If this was not done I would consider it a minor breach only, given the written advice.

4. Any further comments/recommendations

The area of ongoing responsibility for results of tests ordered in the Emergency Department is difficult and fraught with opportunities for error. The most appropriate clinician to follow up any finding or result which does not immediately affect an episode of care (i.e. within a few days of ED visit) is the General Practitioner. I believe that this case fell into the category that would be most appropriately followed up with a GP. The corollary of this is that communication and handover of care to the GP should be clear and unambiguous, with time and action specific written discharge instructions to the patient and GP, and verbal instructions to the patient at discharge. While [Dr C] felt that he had handed over responsibility for the result to the GP, errors in communication meant that [Mr A] did not follow up with his GP in an appropriate timeframe. A process by which any test result which required follow up was formally handed over to the GP (such as by an amendment to the electronic discharge summary) would have been useful in this case. The Discharge instruction sheet which Taranaki DHB has developed is excellent, and to be commended. In its current handwritten format it is however a significant amount of extra work for every patient discharged, as a consultant Emergency Physician in a regional New Zealand ED may see upward of 15 patients on a busy clinical shift. This highlights a difficulty in Emergency Medicine documentation, in that the clinical notes, discharge letter to the GP, and discharge information to the patient would ideally be 3 distinct documents, with differing information.

Most Emergency Departments in New Zealand are struggling under unprecedented workloads, and imposing this extra burden of work onto clinicians without extra resourcing isn't reasonable. Some of the responsibility for errors such as this must lie with those responsible for resource decisions at levels far above individual Emergency Departments.

Please let me know if I can be of further assistance in this matter."

Appendix C: In-house general practitioner advice to the Commissioner

The following clinical advice was obtained from general practitioner Dr David Maplesden:

"1. Thank you for the request that I provide clinical advice in relation to the complaint from [Mrs A] about the care provided to her late husband, [Mr A]. In preparing the advice on this case to the best of my knowledge I have no personal or professional conflict of interest. I agree to follow the Commissioner's Guidelines for Independent Advisors. I have reviewed the information on file: complaint from [Mrs A]; response from [Dr D]; GP notes [medical centre]. I have also briefly reviewed the Taranaki DHB clinical notes on file ([the public hospital] and other documentation (including ACC documentation) associated with this case. I have been asked to comment specifically on the role played by [Dr D] in [Mr A's] management prior to his diagnosis of lung cancer in January 2014.

2. Brief clinical synopsis

(i) [Mr A] was a long-term cigarette smoker and had additional health issues of hypertension, COPD, type 2 diabetes and atrial fibrillation. He attended [the public hospital] on 18 February 2013 with recent onset left anterior chest pain. History of chronic cough was noted in the ED report. Some added chest sounds were noted over the left lower lung. Various investigations were undertaken including chest X-ray, the indication on the request form being: *chest pain and sob, r/o pneumothorax.* ED MO interpretation of the X-ray was: *LLL and left perihilar infiltrate* and a diagnosis was made of left lower lobe pneumonia. Analgesia and antibiotics were provided and [Mr A] declined hospital admission. There is no specific advice to GP recorded in the discharge summary. 'Advice to Patient' is recorded as: *Please return to ED if symptoms worsen. Follow up with your GP. Take antibiotics as prescribed.*

(ii) The X-ray was formally reported as: *No pneumothorax or pneumomediastinum. There is a dense pneumonic consolidation medially in left upper lobe and in the lingual. No pleural effusion or cardiac failure. Follow-up imaging in 10–14 days to ensure resolution is recommended.* [Dr D] was 'copied in' to the X-ray report and he states the report was viewed and filed on 20 February 2013. The report was addressed to the ED MO and [Dr D] states that although he no longer clearly recalls viewing the report, he would have presumed that the requester of the report would arrange recommended imaging follow-up. He states: *Normal medical practice is for the requesting doctor to arrange follow-up of any abnormal test result, including x-ray findings, which I note is stated in the [the public hospital] policy* (not viewed). I note there are issues unrelated to my advice in regard to the accuracy of the reporting of this X-ray and a subsequent left shoulder X-ray undertaken in May 2013.

(ii) [Mr A] evidently recovered from his symptoms and did not present for the recommended GP follow-up. He saw [Dr D] for repeat of his routine medications

on 17 April 2013 and no particular issues were identified. Smoking cessation advice was provided. [Mr A] presented to an after-hours facility (the accident and medical clinic — PUD) on 7 May 2013 with a left shoulder injury, and on 19 May 2013 with a wrist lump (ganglion). On 9 July 2013 [Mr A] presented to PUD with symptoms of a chest infection although his lung fields were recorded as being clear. Antibiotics were prescribed. A telephone prescription for his usual medications was provided by [Dr D] the same day.

(iii) [Mr A] presented to [Dr D] for routine review and prescriptions on 11 October 2013. Notes include: *Feels well, has been dieting and lost some weight, does get sweat at night sometimes, for years, just top half of body which is usually not covered by blankets …* Smoking cessation was again discussed and medication prescribed to assist with this. Routine blood tests were ordered and showed a mild iron deficiency anaemia. [Dr D] recalled [Mr A] for review on 18 October 2013 and noted absence of suspicious GI symptoms and normal abdominal examination. Faecal occult blood tests were ordered and referral made for endoscopy (colonoscopy normal 29 November 2013).

(iv) [Mr A] was [reviewed at] [the medical centre] on 13 December 2013 following development of a pain-free epigastric lump on sitting up the previous note. A diagnosis was made of rectus divarication. Further smoking cessation advice was provided.

(v) On 28 January 2014 [Mr A] attended [the] ED with a two day history of left sided chest wall pain. X-rays revealed a large left upper lung mass subsequently confirmed to be a malignancy. It is assumed that had [Mr A] had a repeat chest X-ray undertaken early in 2013 as recommended, and persistence of the left upper lobe abnormality previously detected was noted, the malignancy may have been detected at an earlier stage.

3. An article provided by BPAC to GPs in 2014 discussed expectations, pitfalls and recommendations with respect to management of patient test results.[1] Discussion included the following (my emphasis in bold type):

(i) The Cole's Medical Practice in New Zealand guidelines (2013) are a set of principles intended for all registered doctors working in New Zealand. The guidelines are based on generally accepted standards of practice, and from case experience of disciplinary tribunals, in accordance with advice from the Health and Disability Commission.

Cole's lists eight key principles for managing clinical investigations, to ensure patient health and safety:[2]

[1] BPAC. Taking responsibility for test results: a discussion. Best Tests. August 2014. Available at: http://www.bpac.org.nz/BT/2014/August/testresults.aspx Accessed 1 December 2015

[2] St George IM. The management of clinical investigations. Chapter 14 in St George IM (ed.). Cole's medical practice in New Zealand, 12th edition. Medical Council of New Zealand, Wellington. Available from: www.mcnz.org.nz/assets/News-and-Publications/Coles/Chapter-14.pdf

a. If you request a clinical investigation, you should tell your patient why the clinical investigation is recommended and when and how they will learn the results

b. All the relevant parties should understand their responsibilities clearly

c. If you are responsible for conducting a clinical investigation you are also responsible for ensuring that the results are appropriately communicated to those in charge of conducting follow up, and for keeping the patient informed

d. If you are responsible for informing the patient, you should:

Inform the patient of the system for learning of test and procedure results, and arranging follow up

Ensure that staff and colleagues are aware of this system

Inform patients if your standard practice is not to notify normal results and obtain their consent to not notifying

If other arrangements have not been made, inform the patient when results are received. This is especially important if the results raise a clinical concern and need follow up.

e. Identifying and following up overdue results is an essential, but [sometimes] difficult, office management task. Your system should ensure that test results are tracked successfully. Such a system might be a paper file or computer database that identifies:

High risk patients

Critical clinical investigations ordered

Dates of reports expected

Date of expected or booked follow up patient visit

f. The patient's medical chart itself might be flagged in some way to aid this tracking

g. It can sometimes be difficult to contact a patient by telephone, and sometimes they do not attend planned follow up appointments:

The number and intensity of efforts to reach the patient by telephone should be proportional to the severity and urgency of the medical problem. All attempts to contact the patient should be documented.

If the patient fails to attend an appointment, or you have been unable to speak to them directly about test results which raise a clinical concern, then send a letter to the patient advising them of the action they should take

h. If you order investigations it is your responsibility to review, interpret and act on the results. If you go off duty before the results are known, you should alert the incoming doctor that there are results outstanding. Furthermore, you should check the results when you are next on duty.

(ii) **It should be the responsibility of the clinician who has ordered the test to ensure that the results are reviewed, the patient is informed and any necessary action is taken.**

This can mean that the clinician themselves undertakes this role, or that they take responsibility for delegating this to someone else. An effective electronic management system is also an essential part of this process.

Once a test has been requested, responsibilities include:

Following up the result in the expected time frame

Following up with the patient if they have not presented for the test (relying on a system that can identify this)

Ensuring the patient has been notified of their results

Discussing with the patient the intended course of action in response to the test result, e.g. a repeat or additional investigation, a change of medicine or reassurance; this should be documented in the patient's notes

Referring the patient to another provider if necessary on the basis of results received

Forwarding results, particularly abnormal results, to other providers involved in the patient's care, as appropriate

Arranging for urgent test results to be followed up after hours; contact details of the clinician who will follow up the result and the patient's contact details should be included on the request form in case the result requires urgent action. Practices may have a 'last resort' arrangement with the local after hours service if they are unable to provide an after hours contact.

(iii) When multiple clinicians are copied in on a request form for a test, results will be sent to each clinician. **This can create a particular risk of error if it is unclear who has responsibility for following up results and whether follow up has occurred. It needs to be made very clear who is responsible for following up the test results. Although best practice is for the clinician who ordered the test to be responsible for following up the results, this may not always occur.** For example, if a test has been ordered from an after hours clinic and the result is not urgent, it may be assumed that the patient's usual doctor, who is copied into the results, will follow this up. **Unless communication has been received about who is responsible, clinicians who have been copied in to test results should double check that the result has been actioned and the patient has received appropriate follow up**. One way to avoid confusion about responsibility for following up results is instead of copying other clinicians in to results, they can be informed about the results (if necessary) in an email or letter. A common scenario is for primary care clinicians to be copied in to multiple results from tests performed on patients in secondary care, or to be sent instructions to follow up tests, or request additional tests, in a discharge letter. Often the primary care clinician will be unaware of the clinical situation regarding the patient, and they may not have been seen in the general practice for several years, and may even be

no longer registered with the practice. It is then very difficult to take responsibility for following up results. In addition, the clinician may feel hesitant to counsel a patient about a result or undertake further investigations when they are uncertain about the clinical context. Responsibility may extend to informing the secondary care clinician who ordered the test that follow-up will not be undertaken (or that further information is required).

4. In 2005 the RNZCGP published recommendations for practices developing test result management policies.[3] Section G of that publication referred to tests requested by 'other providers' and included the following comments:

(i) Does the practice clarify clinical responsibilities when providers outside the practice initiate tests and the result is received by the practice? This is a problem area where interpretation of the results requires the patient's full clinical picture to determine the need to act. Such situations require a judgment call on the available information.

(ii) Some situations — where the duty of care to the patient has been clearly transferred to the GP (including clinical details) — or where the result indicates a life-threatening situation, call for the GP to act.

5. Comments

(i) It was clinically appropriate that [Mr A] have a follow-up chest X-ray after his ED consultation in February 2013 because he was at increased risk of lung cancer given his age and smoking history, and an upper lobe abnormality had been detected — most likely infective in nature (although I note from ACC documentation that adequacy and accuracy of the X-ray interpretation has been questioned) but it was important to exclude an underlying malignancy that might have caused, or been obscured by, the identified infection. Smoking history was not recorded on the chest X-ray request form which I think is a significant omission. Local primary guidelines on suspected cancer[4] include the recommendation: *A person with risk factors for lung cancer who has consolidation on an initial chest x-ray should have a repeat chest x-ray within 6 weeks to confirm resolution.*

(ii) [Mr A's] chest X-ray was ordered by the ED MO and interpreted by him. He identified a left lower lobe and hilar abnormality (in contrast to the formal report which identified a left upper lobe and lingula abnormality). My expectation would be that the MO discusses the abnormal result and its significance with the patient prior to discharge, including recommended follow-up. I would expect the MO to be aware that X-ray evidence of lung consolidation in a smoker, particularly a smoker in whom he has recorded a chronic cough symptom, requires radiological follow-up and that this issue be discussed with the patient prior to discharge. Given the absence in the discharge summary of any explicit instruction to the GP

[3] The Royal New Zealand College of General Practitioners — Managing patient test results — Minimising Error. Second Edition, July 2005. Available from: http://www.rnzcgp.org.nz/assets/documents/Publications/College-Resources/Managing-Patient-Test-Results-July-2005.pdf Accessed 1 December 2015

[4] New Zealand Guidelines Group. Suspected cancer in primary care: guidelines for investigation, referral and reducing ethnic disparities. Wellington: New Zealand Guidelines Group; 2009.

regarding follow-up or responsibility for actioning abnormal results, I would expect the ED MO, on reviewing the formal X-ray report, to have contacted the GP by telephone or in writing to clarify who was taking responsibility to notify [Mr A] of the need for repeat X-ray and to arrange this X-ray. This is particularly so if there was a DHB policy to the effect that clinicians ordering tests were responsible for appropriate management of results of those tests as stated by [Dr D]. I think these expectations are consistent with the discussion in section 3. If, in the discharge summary, there had been explicit deputising of results management to the GP I would be somewhat less critical but as the case stands I am moderately critical of the omissions identified.

(iii) From a GP perspective, in the clinical scenario described the follow-up chest X-ray was important although could not at the time be perceived as 'critical' (see 4(ii)). [Mr A's] apparent good recovery from his acute illness, failure to present to [Dr D] for review in the days following his ED attendance, and subsequent general 'wellness' may have distracted [Dr D] from the fact that the 'expected' follow-up chest X-ray result was never received. There was apparently no 'trigger' for him to question [Mr A] regarding the follow-up X-ray at subsequent consultations. Nevertheless, under the circumstances I am mildly critical that [Dr D] was not more proactive in confirming his assumption that the ED MO would be organising the recommended follow-up chest X-ray (particularly as there was no mention in the ED discharge summary of the need for such follow-up). If [Dr D] was assuming another clinician was ordering the recommended test, and noting the result was somewhat important given [Mr A's] increased risk of lung cancer, it would have been prudent for him to use a 'reminder' system so he would be aware if the expected result had not been received within a reasonable time frame (in this case six weeks). It appears [the medical centre] has made changes to its results handling policy since the events in question that takes these factors into account.

(iv) This case, including the content of the various responses, illustrates the lack of clarity that surrounds handling of results ordered by secondary care providers with copies going to primary care (or vice versa). There appear to be differing assumptions by the various providers, and these assumptions lead to the risk of abnormal results 'falling through the cracks'. I think it is unreasonable to expect primary care providers to have to check with their secondary care colleague as to who is taking responsibility for management of every significantly abnormal result originating from secondary care that they are copied in to. A more reasonable expectation is that the clinician ordering the test and receiving the result manages that result in an appropriate fashion (which includes notification of the patient where appropriate), which might include formally deputising management of the result to a third party verbally or in writing (with that action recorded). I feel that in any case where a potentially significant result has been received and there remains doubt as to who is managing it, both the requester and those in receipt of the result have a responsibility to ensure it is managed appropriately."

Dr Maplesden subsequently provided the following further expert advice:

"1. Thank you for requesting brief clinical advice on this case. You have provided the following background:

On 7 May 2013, [Mr A] presented to the accident and medical clinic, as he had [hit his left upper arm the previous day] and could not lift his arm. [Dr F] examined [Mr A], noting that he had previously had a torn ligament in his left shoulder. Her impression was: 'rule out fracture humeral head/dislocation. ?Any axillary nerve damage. Likely [musculoskeletal] pain.' She ordered a left shoulder X-ray. The X-ray referral stated 'walked into [object] yesterday with left shoulder/upper outer arm and now cannot abduct or flex the shoulder'. Standard X-ray imaging was undertaken by a radiographer (medical imaging technologist) at [the radiology service], showing two views of the shoulder.

[Dr F] then reviewed the X-ray and documented:

'Please advise [patient] that I have spoken to ortho[paedic] registrar and we cannot see any abnormality on the xray. Likely musculoskeletal pain/swelling and unlikely nerve damage. For sling/NSAIDS as prescribed and await radiology report. If not settling in 1 week or if [symptoms] worsen for review please.'

Radiologist [Dr B] from [the radiology service] reported: 'No significant change from October 2008, with mild subacromial spurring re-demonstrated. This would not exclude underlying cuff injury or degeneration.' A left upper lobe lung mass visible on the X-ray was not reported on. [Mr A] was subsequently diagnosed with lung cancer in January 2014.

2. You have requested the following advice: *Please advise on the reasonableness of the care provided to [Mr A] by [Dr F], including whether you would have expected [Dr F] to have identified the lung mass.*

3. I have reviewed the clinical notes for the consultation of 7 May 2013. Clinical documentation is of a good standard. There is a clear history of recent injury to the left shoulder and the assessment of the injury and subsequent investigations and management are appropriate for the presumed diagnosis of soft tissue injury. Most GPs have limited experience in interpretation of X-rays although should be capable of detecting obvious fractures/dislocations. In the situation described in the consultation notes, the GP's attention was directed towards excluding a fracture or dislocation of the humerus. It appears the GP sought a second opinion from the orthopedic registrar and her recorded comment implies the registrar also viewed the films, such access now being common place via digital images/PACS (picture archiving and communication system). Apparently neither the GP nor the registrar detected the incidental finding of a lung mass and I do not think this is surprising under the circumstances described, with the focus being on the site of injury and experience in detecting incidental non-orthopedic findings being very limited for both parties. GPs will generally rely on formal radiology reporting to pick up any missed incidental or subtle findings, and [Dr F] refers to this in her notes as: *await xray report.* She also provided appropriate 'safety-netting' advice. Unfortunately, the radiologist also did not detect the lung mass on this occasion despite her specialised training, experience and equipment and there was therefore no signal to [Dr F] to review her diagnosis or findings. In summary, I do not feel [Dr F's] management of [Mr A] departed from expected standards of care."