Registered Nurse, RN B

Registered Nurse, RN C

District Health Board (now Te Whatu Ora)

A Report by the

Deputy Health and Disability Commissioner

(Case 21HDC01173)

Health and Disability Commissioner
Te Toihau Hauora, Hauātanga

Contents

Executive summary

1. This report concerns the care provided to an elderly man by two nurses and a district health board.

2. The man was admitted to hospital with stroke-like symptoms. A CT scan indicated that he was having seizures, and he was prescribed levetiracetam. However, two registered nurses prepared and administered the incorrect medication, levomepromazine.

3. The man became unresponsive and was transferred to the Intensive Care Unit (ICU). Three days later, the man passed away of pneumonia following the overdose of levomepromazine.

4. This report highlights the importance of following procedures when preparing and administering medication.

Findings

5. The Deputy Commissioner considered that both nurses failed to comply with the DHB's policy and the NZNO guidelines, and did not identify the errors in preparation despite multiple further opportunities and/or red flags. The Deputy Commissioner found the nurses in breach of Right 4(1) and Right 4(2) of the Code.

6. The Deputy Commissioner was critical of the DHB's unclear policy and its storage of the medication.

Recommendations

7. The Deputy Commissioner noted that the first nurse had provided an apology to the man's family, and recommended that in addition, the nurse report back to HDC on any medication errors that have occurred subsequently, and any further changes made to her practice.

8. The Deputy Commissioner recommended that the second nurse provide the man's family with an apology for her breach of the Code.

9. The Deputy Commissioner recommended that Te Whatu Ora provide HDC with an update on the changes made as a result of these events; undergo an audit of all medication errors and staff compliance with its policy; evaluate its practice of independent double-checking and the education provided on this; ensure that the updated medication policy includes clear definitions; evaluate the setup of its medication management/storage systems, and initiatives to improve checking compliance and reduce human errors; and evaluate the adequacy of staff education on the correct procedure for independent double-checking and the 5+3 medication rights.

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Complaint and investigation

10. The Health and Disability Commissioner (HDC) received a complaint from Mrs A via the Coroner's Office about the services provided by Registered Nurse (RN) B, RN C, and a district health board (DHB) (now Te Whatu Ora).[1] The following issues were identified for investigation:

- *Whether RN B provided Mr A with an appropriate standard of care in 2018.*
- *Whether RN C provided Mr A with an appropriate standard of care in 2018.*
- *Whether the DHB provided Mr A with an appropriate standard of care in 2018.*

11. This report is the opinion of Deputy Commissioner Dr Vanessa Caldwell, and is made in accordance with the power delegated to her by the Commissioner.

12. The parties directly involved in the investigation were:

Mr A	Consumer
Mrs A	Complainant/consumer's wife
RN B	Registered nurse/provider
RN C	Registered nurse/provider
DHB	Provider

13. Further information was received from:

Dr D	Consultant
Dr E	Medical registrar
Ms F	Pharmacy technician
Ms G	Pharmacist
Ms H	Pharmacist
Nurse Manager	
Pharmacy Manager	

14. Pharmacist Ms I is also mentioned in this report.

15. Independent nursing advice was obtained from RN Lynsey Sutton-Smith (Appendix A).

16. Relevant guidelines are set out at Appendix B.

[1] On 1 July 2022, the Pae Ora (Healthy Futures) Act 2022 came into force, which disestablished all district health boards. Their functions and liabilities were merged into Te Whatu Ora|Health New Zealand. All references in this report to the DHB now refer to Te Whatu Ora.

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Information gathered during investigation

Background

17. Mr A was in his nineties at the time of this event. His medical history included two previous strokes, [2] polycythaemia vera, [3] carotid endarterectomy, [4] high blood pressure, dyslipidaemia,[5] gout, an MoCA[6] score of 14/30[7] in 2016, and chronic obstructive pulmonary disease.[8]

18. Prior to his admission to hospital, Mr A was receiving respite care at a care home. Mr A fell from his bed. He was found on the floor and did not remember falling. His wife, Mrs A, noted that he had a black eye and a lump on his head.

19. Mr A was monitored overnight and returned home.

Admission — Day 1

20. The following day, (Day 1), Mr A became agitated and, on the advice of his in-home carer, Mrs A called for an ambulance. Mr A was admitted to the Emergency Department at the public hospital with stroke-like symptoms, sudden onset right-sided weakness, slurred speech, and a facial droop.

21. Mr A had a CT scan and was assessed by the on-call Senior Medical Officer, Dr D, who believed Mr A was having a seizure and that there was still ongoing evidence of seizures. He noted that Mr A's face was twitching and his tongue was moving rhythmically. Dr D asked the registrar to treat Mr A for epilepsy with 250mg of intravenous (IV) levetiracetam.[9] Mr A was admitted to the stroke unit (a general internal medicine ward) on the evening of Day 1.

Day 2

22. At 6.45am on Day 2, RN C[10] arrived for her shift as a senior nurse and team leader on the ward. Her role as team leader added additional responsibilities alongside her patient workload, such as arranging for staff breaks and escalating high acuity patients to the Associate Charge Nurse. For this shift, RN C allocated herself three patients who were all in the stroke unit, including Mr A. Mr A had been charted diazepam[11] as required and

[2] One in 2016 resulting in residual left-sided weakness, the second in 2017 resulting in persistent right upper quadrantenopia (loss of vision in one quarter of the visual field).
[3] A disorder in which the bone marrow makes too many blood cells.
[4] Surgery to treat carotid artery disease.
[5] An abnormal amount of lipids in the blood. Dyslipidaemia is a risk factor for the development of atherosclerotic cardiovascular disease.
[6] Montreal cognitive assessment.
[7] Scores on the MoCA range from zero to 30. A score of 26 and higher is considered normal.
[8] A group of lung diseases that block airflow and make it difficult to breathe.
[9] Medication used to treat epilepsy (brand name "Keppra").
[10] RN C is a former registered nurse. She worked as a registered nurse for many years.
[11] Diazepam is a long-acting benzodiazepine with a rapid onset, commonly used to treat panic disorders, severe anxiety, alcohol withdrawal, and seizures.

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levetiracetam, of which his next dose was due at 10.00am. RN B[12] commenced her shift at 8.00am.

23. While RN C was doing her observations, Mr A had a focal seizure[13] that lasted 15 seconds. RN C asked RN B, who was tending to another patient in the same room, to help her to reposition Mr A in his bed. Mr A then had another focal seizure that lasted 30 seconds.

24. Mr A continued to be restless while RN B and RN C conducted observations. Just before 8.30am, Mr A had another focal seizure that lasted 30 seconds. RN C noted that his seizures were escalating. RN B and RN C agreed that Mr A should be reviewed by the medical team. RN C spoke to a house officer, who confirmed that Mr A was on the list of patients to be seen that morning.

Medical review

25. At 9.10am, Mr A was reviewed by Dr D, Dr E (a medical registrar), and the house officer during the morning ward round. RN B and RN C were also present at the review. Due to the ongoing focal seizures, Dr D and Dr E agreed for Mr A to continue to be administered diazepam, and for the dosage of levetiracetam to be increased from 250mg to 500mg twice per day. Dr E adjusted the dosage in the electronic medication chart (MedChart) to reflect this decision. In addition, the plan was made for a review by a speech language therapist.

26. The change in levetiracetam dosage was communicated to RN B and RN C verbally. RN B noted that at this time, there was a sense of urgency to administer the medications quickly in order to control the seizure activity and prevent further brain damage.

Retrieval of medication

27. At the time of the events, the DHB's Checking IV Medications and Fluids policy (see Appendix B) required that two IV-authorised staff undertake a double-checking process to ensure the correct administration of medication. The policy stipulated:

> "All intravenous (IV) medication and fluids should be double-checked with either another authorised staff member or a competent other during the preparation period. This is termed the 'Treatment Room' check.
>
> Both staff involved in the check must carry out any drug calculations independently to help prevent error.
>
> …
>
> It is [DHB] policy that all HIGH-risk IV medications and fluids must be checked by two authorised/one authorised and one competent other at the bedside, in an uninterrupted process, following an independent double checking process. A

[12] At the time, RN B was working as a lead stroke nurse in the acute stroke unit. She was also on a return-to-work programme following time away from work.

[13] Focal seizures occur when nerve cells in the brain send out sudden, excessive, uncontrolled electrical signals.

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permanent record is maintained by both personnel legibly signing the medication chart."

28. The policy also stipulated a 12-step pre-administration check to be completed by authorised staff prior to the medication being administered, which included checking the fluids or medication, volume, and rate against the prescription. Both RN C and RN B were IV-authorised staff for the purpose of the policy.

29. Pharmacy technician Ms F was working in the medical room on the ward on Day 2. In her statement to the Police, she said that she had been there for approximately 15 minutes before a nurse she identified as RN B asked her where to find the Keppra (brand name of levetiracetam), to which Ms F responded, "It's on the shelf." Ms F stated that following this, a second nurse entered the room (RN C, although Ms F did not know her name at the time).

30. RN B logged into Mr A's file as per usual practice. She then went to the locked cupboard expecting to find both diazepam and levetiracetam. However, RN B could not find the latter in the cupboard and asked RN C whether they had run out. RN C informed her that the levetiracetam had been moved to the shelf opposite, with the other injectable drugs. This change had been made while RN B had been off work.

31. RN B selected the diazepam and discussed what dosage to give (it had been prescribed as 5–10mg as needed), and a 5mg dose was prepared.[14] The diazepam was countersigned by RN C at 9.15am.

32. RN B went to retrieve the levetiracetam from the shelf and saw a medication beginning with "lev" and selected it believing that it was levetiracetam. However, at this time, RN B mistakenly selected levomepromazine (an anti-psychotic medication) from the shelf. At the time of events, both medications were located on the shelf under "L". RN B stated subsequently that she was not familiar with levomepromazine and could not recall ever having administered it herself on the ward, and she was unaware that the ward even stocked it.

33. RN C then checked the name on the box that RN B had retrieved, and also erroneously read the name as levetiracetam.[15] When opening the box and taking out the ampoules,[16] RN C noted that they were smaller than she remembered, at 25mg/5ml. She stated that when she questioned this with RN B, she was told that "there had been a recent change in the medication". In addition, the box containing levetiracetam was black and white and the box containing the levomepromazine was white, blue and red. The boxes are also different sizes.

34. According to both the adverse event report (AER) and RN B, she and RN C then checked the medication they believed, in error, to be levetiracetam, against what was displayed in Mr A's MedChart record. RN C's statement does not refer to this check.

[14] Both RN B and RN C noted that they prepared the diazepam.
[15] According to the adverse event report undertaken by the DHB following the events.
[16] Small sealed vials used to contain medication.

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35. RN B noted that levetiracetam usually came in a 500mg bottle and not in 25mg ampoules. They identified that they would need 20 ampoules of the medication to make up the 500mg/5ml that had been prescribed.

36. In a subsequent statement to the Police, Dr D said that "if he was going to prescribe [levomepromazine], the quantity of the script would have been something like 6 [mg], for a man of [Mr A's] age".

37. In a subsequent statement, RN B noted that she questioned in her mind the fact that they were using 20 ampoules. However, she stated that she was aware that there had been changes made to medication in the time she had been away, and had noted that other medications used on the ward can be made up using smaller doses, such as an iron infusion, which can use up to 20 ampoules.

38. The medication room did not have the required number of ampoules to make up the 500mg dose. Ms F, in her statement to the Police, said that she overheard RN C and RN B discussing that they needed 500mg of a particular drug and there was not enough in stock. Ms F told Police that at this point she did not know which drug they were discussing. She told Police:

> "I turned around and I saw that [RN B] had Levomepromazine in her hand. She asked me if there was anymore. I said '[another ward] had some' … At that point, the second nurse … she went off to [the adjacent ward] to get some more."

39. RN C went to the medication room in the adjacent ward, and took the box they had already retrieved (the levomepromazine) to ensure that they were getting the same medication. RN C collected the incorrect medication from the "L" section of the medication room on the adjacent ward and took it back to RN B. Both RN B and RN C then checked each ampoule to ensure they were the same medications.

40. In her statement to the Police, Ms F said that she questioned the dose with RN B, as 500mg of levomepromazine (which would require 20 ampoules) seemed like a lot and it felt "wrong". Ms F stated that she asked RN B if the dose was correct, and suggested that she might want to check MedChart to confirm it. Ms F noted that during the conversation she used the proper drug name, levomepromazine. Ms F stated that RN B confirmed to her that it was the correct dose.

Preparation of medication and second check

41. RN C stated that when she returned to the medication room, both she and RN B checked MedChart for the dilution needed for the infusion of 500mg of levetiracetam.

42. Both RN C and RN B stood together and checked the name and expiry date on each of the levomepromazine ampoules and set them to one side. RN C noted in her submission to the Coroner that she recalled that RN B verbalised the expiry date and RN C checked it and agreed that it had not expired. At this point, neither RN B nor RN C identified that the ampoules were levomepromazine and not levetiracetam. In her statement to the Coroner, RN C considered that in hindsight they were more concerned with checking the dates on each ampoule to ensure that the medication had not expired, as at the time they believed

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they had the levetiracetam. Neither nurse rechecked the MedChart prescription at this point to make sure they were signing for the correct drug.

43. The AER states that what occurred in the checking process was a "double check". The AER notes:

> "A double check of medication is when both staff check the medication at the same time — often this is called out by one staff member, and acknowledged by the second, as opposed to independent double check where both staff check silently independently of each other and then verbalise against the prescription."

44. RN B retrieved a 250ml bag of normal saline and withdrew 50ml to leave the 200ml volume. RN C drew up the ampoules of levomepromazine into a syringe, and then inserted this into the 200ml of normal saline. At this point, the MedChart was countersigned by RN C.

45. RN C noted in her submission to the Coroner that during the medication checking they were under pressure, with the knowledge that Mr A was becoming more agitated and needed the medication quickly, as his seizures were escalating and they wanted to provide him some relief. She said that levetiracetam was known to her but she had not given it as an IV dose recently, and on the previous occasion she had been the countersigning nurse.[17] She knew that it was prescribed for seizure activity, and previously had given the oral version in tablet form. She had never given levomepromazine, and did not know of the medication, and did not know that it was stocked on the ward.

46. After preparing the medications, RN B and RN C went to Mr A's bedside to prepare for administration.

Administration of medication

47. RN B and RN C undertook the double-checking of the patient's wristband for Mr A's name, date of birth, and NHI number before they began to administer the diazepam.

48. RN B stated that a commonly used nursing practice when checking medications is to say the name of the medication to the other nurse, which is what she did in this case.

49. RN C then hung up the IV bag containing the levomepromazine, and both nurses discussed and agreed that levetiracetam is usually given over an hour. They commenced the infusion of 500mg levomepromazine. Mr A's MedChart records both RN B and RN C as having administered one dose of 500mg levetiracetam at 9.22am on Day 2.

50. RN B and a healthcare assistant gave Mr A a morning wash while RN C went to check in with her other team members.

51. During the washing process, RN B noted that Mr A had become unresponsive to them moving him around in the bed, but she considered that it could be the diazepam working.

[17] She had performed a second check of the charted treatment and signed that it was correct.

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According to RN B, at this stage Mr A's seizures had ceased, his breathing was good, and his respiratory rate was normal.

Subsequent information — Pharmacy Department investigation

52. When Ms F returned to the medication room on the adjacent ward she noticed that the levomepromazine stock was reduced from the normal holding level. She presumed that RN C (although she was unsure of her name at the time) had taken it, although she could not say this for certain.

53. Ms F returned to the Pharmacy Department at about 9.45am and found her colleague, Ms I. Ms F mentioned to Ms I something along the lines of, "Is 500mg an okay dose of levomepromazine?", to which Ms I replied, "No." Ms F then informed Ms I of her concern that it was going to be used on the stroke ward. Ms F said that she stayed in the pharmacy, and she did not know the correct drug the nurses should have been administering, nor did she know the name of the patient, and did not look up the medications on the chart — she questioned it only on a hunch.

54. Ms I noted in her statement to the Police that following her discussion with Ms F regarding her concerns about the levomepromazine, she called the ward because if there was a mix-up like that it would be serious.

55. Ms I said that while she was calling, she spoke to a senior pharmacist and asked for her help. The senior pharmacist returned with a list of patients to see if anyone had been charted levetiracetam, and found this to be the case. By this time, Ms I's call had been picked up by someone on the ward who had then hung up immediately. Ms I called back and was put through to the Charge Nurse, but no one answered.

56. Ms I then went to discuss the matter with the pharmacist who was working on the ward, Ms G. Ms I explained what Ms F had overheard and that potentially the wrong medication had been administered. Ms G was surprised that a mistake like this could happen due to the number of vials that would need to be opened to obtain the 500mg dose. Ms G then went to the ward with another pharmacist, Ms H.

57. Ms G noted in her statement to the Police that at the time, levomepromazine and levetiracetam were very different strengths, and the packaging and dose are very different. She thought it was highly unlikely that levomepromazine had been prepared for the patient, as two nurses would have checked the medication, and they would have had to open 20 ampoules.

58. When Ms G and Ms H arrived in the drug room they found 20 open ampoules of levomepromazine and began to panic. They went to find the nurse who was looking after Mr A, RN C. Ms G asked RN C if she had given the medication to Mr A, and RN C replied that she had. Ms G did not use the name of the medication. She asked again, "Did you give the vials that were in the medication room because that is levomepromazine and not levetiracetam." Ms G cannot remember RN C's response, but could tell by the look on her

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face that the patient had received the wrong medication. In contrast, RN C told the Coroner that she did not become aware of the error until informed by Dr E (discussed below).

59. Following this, Ms G called Dr E and informed him that Mr A had received the wrong medication.

Discovery of error

60. RN C said that while Mr A was being washed, she had a "niggle" in the back of her mind that the infusion rate seemed fast, and she returned to the medication room to check the infusion rate. The empty ampoules and box were still in the room, and she picked up an ampoule and re-read the name as levomepromazine. She looked up levomepromazine in the medication administration book and saw that it was supposed to be given as a direct IV push (manual administration of a small volume of fluid/medication) rather than an infusion (a controlled administration of medication into the bloodstream over time). RN C said that at this point, she thought that they had given the medication via the wrong route, rather than the wrong medication entirely.

61. Following this, RN C returned immediately to Mr A's bedside and turned off the infusion. RN C told RN B that the medication was not supposed to be given via infusion. The clinical records state that by this time, 210mg of levomepromazine had been administered to Mr A.

62. RN B and RN C returned to the medication room and looked up the medication administration and noted again that it was supposed to be given as a direct IV push. Neither RN B nor RN C noticed at this time that they had administered the wrong medication.

63. When they returned to Mr A, Dr E (who had been advised of the error by the pharmacist) was at Mr A's bedside with Mr A's wife. Dr E asked RN C how much of the infusion had gone through, to which she responded 80ml.[18] Dr E then asked RN C to carry out a 12-lead ECG.

64. Dr D then arrived to speak to Mr A's wife, and told her that the wrong medication had been given. RN C noted in her submission to the Coroner that this was the first time she realised that the incorrect medication had been administered.

65. Following her realisation of the error, RN C removed herself on the advice of her Charge Nurse Manager, and did not make any entry into the clinical notes for the shift. RN B documented the incident report.

66. At 11.40am, Mr A was moved to the Intensive Care Unit (ICU). At 1.30pm on Day 5, ICU doctors had a discussion with Mrs A about palliative care. At 10.54pm that night, Mr A passed away of pneumonia following the overdose of levomepromazine.

Further information

RN B

67. Following the event, RN B provided Mr A's family with an apology, which included:

[18] However, the records are not clear on how much levomepromazine had in fact been administered.

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> "However inadequate this may seem to you, I wanted to give you all my sincerest and heartfelt apologies for my role in the medical error
>
> …
>
> Although it will be small comfort to you, this error has certainly had a huge impact upon my life and much reflection has occurred upon my nursing practice, as a result."

68. RN B noted that later she found that the levetiracetam had been placed on the bottom shelf along with the orally administered stroke medications. It has now been moved to a shelf above the controlled drug cupboard.

69. RN B told HDC that from the outset she took responsibility for her role in what happened, and she continues to do so. She accepts that the care provided to Mr A fell below the standards expected of her.

70. RN B told HDC that she believes that the factors that contributed to this error were:

a) The drugs both have long pharmaceutical names starting with LEV.

b) Both drugs have names that are difficult to pronounce.

c) Because levetiracetam is hard to pronounce, it is commonly referred to on the ward by its brand name of "Keppra".

d) In relation to the 20 ampoules needed to make up the dose, there are other medications made up on the ward using small doses. For example, iron infusion can include up to 20 ampoules.

RN C

71. RN C told HDC that she wishes to extend her sympathies to Mr A's family, and her sincere apologies for the medication error that occurred.

72. RN C told HDC that the medication room was very crowded that morning, causing a lot of background noise. Mr A's condition was very concerning and he deteriorated very quickly, putting pressure on RN B and RN C to administer the medication. RN C stated that "nursing has become a lot more time constrained and stressful over recent years".

73. RN C told HDC:

> "Whenever I think of that day, it is hard to acknowledge the mistakes [RN B] and I made caused the death of [Mr A]. In the previous … years of my nursing career I had been focused on bringing patients back to good health so they could live life. I very much regret the pain and sorrow we caused his wife and family and hope their pain and sorrow is eased with the support they have received from family and friends."

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74. RN C also told HDC:

> "Once the seriousness of the medication error was identified [the DHB] notified the Police, and a formal investigation was completed. In the pharmacist's statement[19] to Police, she acknowledged the drug [levetiracetam] had been recently moved and nursing staff had not been informed. In the Charge Nurse's statement to Police, she acknowledged the 2 drugs involved were now kept in separate drug rooms. The Charge Nurse also stated that the drugs in both medication rooms were now set out alphabetically from A–Z to make finding medication easier. To me these 2 actions were very positive for future nursing staff accessing medication."

75. RN C is no longer working as a registered nurse.

DHB

76. Following this event, the DHB undertook a review of the care provided to Mr A. The review found that the root cause of the event was that "the process for [an] independent double check [was] not followed correctly".

77. The review detailed the contributing factors as:

a) "[U]nfamiliar with the IV administration of the medication prescribed"

b) "[L]ayout of the medication in the medication room"

c) "Look alike/sounds alike medication"

d) "Busyness of the environment"

78. The DHB told HDC that although significant efforts have been made to review and improve medication safety practice as a result of this error, human factors cannot be eliminated in the medication administration process. The DHB stated that it was continuing in its pursuit of improving medication safety and the potential to introduce more effective system-based/ technology-type solutions. The DHB said that it would welcome the Health Quality and Safety Commission coordinating an approach to medication storage and administration practice that is consistent nationally. The DHB made multiples changes following these events, which are discussed under the "Changes made" section below.

79. The Pharmacy Manager also noted that it is well known that look-alike[20] and sound-alike medications are a risk to patient safety, and this is a global challenge. The Health Quality and Safety Commission recognises human factors and suggests strategies for preventing errors, noting in particular that look-alike packaging and sound-alike medicines make selection of the wrong medicine more likely. Some common human factors that can increase risk are mental workload, distractions, physical environment, design, and teamwork.

[19] The statement referred to by RN C could not be located in the pharmacist's statement to the Police.
[20] I note that in this case, whilst the medications did sound alike, they did not look alike.

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80. The DHB told HDC that its Trendcare[21] data showed that while there were some initial staffing gaps prior to the commencement of the morning shift on Day 2, these gaps were resolved as the shift was starting. The DHB said that as such, the Trendcare data showed that the area was not poorly staffed on this date.

Responses to provisional opinion

Mrs A

81. Mrs A was provided the opportunity to respond to the "information gathered" section of the provisional opinion and had no comments to make.

RN B

82. RN B was provided the opportunity to respond to the relevant sections of the provisional opinion. She told HDC that she has had no subsequent medication errors.

RN C

83. RN C was provided the opportunity to respond to the relevant sections of the provisional opinion and had no comments to make.

DHB

84. The DHB was provided the opportunity to respond to the provisional opinion.

85. The DHB told HDC that the wording in the Intravenous Policy Principles previously provided to HDC states that an independent double-check was required. However, levomepromazine and levetiracetam are not identified as high-risk medications by the Health Quality and Safety Commission or by Te Whatu Ora's policies, and therefore a second "bedside check" by two authorised staff was not required.

86. The DHB told HDC that the terms "double check" and "independent double check" are often used interchangeably in the literature, and by nursing staff. As noted in the report, the Checking IV Medication and Fluids has been amended to include the word "independently" adjacent to "double check" to make this even more explicit.

87. In addition, Te Whatu Ora stated that it has reflected on the comments about staffing in the provisional report, and does not dispute staff perspectives around busyness. Te Whatu Ora stated:

> "Periods of peak activity and other factors such as the environment, time of day, skill mix, ward rounds and culture will also have an impact. However, with regards staffing on this shift, the staffing gap was identified and rectified at the commencement of the shift straight after handover at approximately 0700 hours. There was an overall positive shift variance of more than six hours. [RN B] was also working in a supernumerary capacity and provided additional support on top of the positive staffing variance."

[21] A workforce planning and workload management system.

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88. Te Whatu Ora told HDC that with this staffing picture, it would not be standard practice at Te Whatu Ora, or in other hospitals, to deploy more resources to a ward that has this level of staffing.

Opinion: RN B/RN C — breach

Introduction

89. RN B had been employed by the DHB in various positions for many years. On Day 2, she was the lead stroke nurse on the ward, a position she had held for the previous two years. At the time of the event, RN B was on a return-to-work programme, and had been away from work for three months. RN C retired in 2021, after working on the ward for many years. On the day of the error, RN C was on duty on the ward as the senior registered nurse allocated to Team One, and she was the designated team leader for the shift.

90. On Day 2, RN B and RN C were the two nurses who prepared, checked, and administered the incorrect medication to Mr A. As health professionals, it was their responsibility to ensure that the care they provided to Mr A met acceptable standards. Nurses are required to administer all medications in compliance with legislation, guidelines, and codes, such as the New Zealand Nurses Organisation (NZNO) "Guideline for Nurses on the Administration of Medicines".

91. In my view, both nurses were responsible for checking that the correct medication was administered to Mr A, and there are no grounds to consider that either RN B or RN C was more at fault for what occurred. Accordingly, this report considers the actions of the two nurses together.

"Checking IV Medication and Fluids — IV Manual"

92. The DHB's "Checking IV Medication and Fluids — IV Manual" sets out a process for staff to follow prior to administering medication. First, there is a "Treatment Room" check (also referred to as a "Pre-administration Check"). The Manual states that for this check:

> "[A]ll intravenous (IV) medication and fluids should be double-checked with either another authorised staff member or a competent other during the preparation period. …
>
> Both staff involved in the check must carry out any drug calculations independently to help prevent error."

93. The "Treatment room/pre-administration" check comprises 12 discrete steps, including checking the medication, volume, and rate against the prescription.

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Checks that occurred

Pre-administration (preparation room) check

94. RN B was working with RN C to prepare the medication for Mr A in the medication preparation area. While RN C was drawing up diazepam for Mr A, RN B picked up a box reading "Lev" and believed this to be levetiracetam.

95. The AER states that RN C then checked the name on the box that RN B had retrieved, and also erroneously read the name as levetiracetam.

96. While RN B states that they checked the medication against Mr A's MedChart at this point, this was not referred to in RN C's statement. Accordingly, I am unable to make a finding as to whether this occurred.

97. My independent advisor, RN Sutton-Smith, stated that the failure to check the box they had picked up against the MedChart prescription was "a significant departure" from the DHB's IV medication policy.[22] Whilst, as above, I am unable to find that no check occurred, in my view it is clear that even if, as per RN B's statement, a check did occur, it was inadequate, and therefore still contrary to the policy.

98. After retrieving further medication from the adjacent ward, both RN C and RN B then stood together and checked the name and expiry date on each of the levomepromazine ampoules and set them to one side. RN C noted in her submission to the Coroner that RN B verbalised the expiry date and RN C checked it and agreed that it had not expired. At this point, neither RN B nor RN C identified that the ampoules were levomepromazine and not levetiracetam. In her statement to the Coroner, RN C considered that in hindsight they were more concerned with checking the dates in each ampoule to ensure that the medication had not expired, as at that time they believed they were checking levetiracetam.

99. After selecting the levomepromazine, both RN B and RN C checked the medication infusion rate with the prescription for levetiracetam on the screen.

100. I note that the NZNO "Guidelines for Nurses on the Administration of Medicines" stipulates:

> "Prior to administration of medicine, the regulated nurse … administering the medicine checks the five rights + three: the right medicine in the right dose must be administered to the right person at the right time by the right route."

Conclusion on checks

101. The AER noted that both nurses specified the checking process they undertook as a "double check", which is a process where both staff check the medication at the same time, often called out by one staff member and acknowledged by the other. This differs from an "independent double check", where both staff check the medication independently, then verbalise against the prescription. The AER emphasised this difference in checking process as being material to the outcome in this case. However, in my view, regardless of what type

[22] I note that point 8 in the list of what needs to occur at the "treatment room/pre-administration check" states that the medication should be checked against the prescription.

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of check was required, and the precise sequence of events that occurred during the treatment room/pre-administration check, it is more likely than not that at no time during that process did either nurse check the name of the medication adequately against Mr A's MedChart, as they did not realise their error at this time. In my view, it is likely that this was partly a case of confirmation bias (being the tendency to search for, interpret, favour, and recall information in a way that confirms or supports one's prior beliefs or values). Specifically, once both nurses thought that they had the right medication, confirmation bias contributed to the failure to realise their error.

102. Similarly, RN Sutton-Smith advised that the requirement to check the correct name of the physical medication against the prescription (one of the "5 rights") was not carried out. She considered this a significant deviation from the standard of care and DHB policy.

Opportunities to identify error

103. Whilst, as noted above, the actions of RN B and RN C contravened the DHB's policy and the NZNO guidelines, I also note that RN Sutton-Smith identified several further opportunities where the error could have been picked up. These are discussed below.

104. RN Sutton-Smith noted that both nurses noticed that the small glass ampoules they were holding contained 25mg of medication, which was different to the usual dose and preparation of levetiracetam, which usually presented in 500mg bottles. She considered the difference in the way the medication was packaged to be a "warning sign" that could have identified the error.

105. Another two opportunities were missed when the dosages were checked. RN C and RN B calculated that they would need 20 ampoules to make up the 500mg/ml dosage that was prescribed. RN Sutton-Smith noted not only that the dosage on the box was different from the prescription (as it was a different drug), but also advised:

> "Whilst I acknowledge rarely, medication doses may need to be prepared using multiple ampoules, 20 ampoules to make up a dose is excessive. It is normal standard of practice, when multiple ampoules are needed to make up a drug, a warning trigger leads the RN to check that the drug dose, drug type and prescription is correct before proceeding. This would be considered standard of practice."

106. A fourth missed opportunity arose when RN C went to find additional boxes of the medication RN B had selected. Following this, they compared the ampoules to ensure that they were all the same medication and had not expired. They were the same medication, but not the correct medication. RN Sutton-Smith noted that this was again a missed opportunity for one of the nurses to notice that the medication was not levetiracetam, and to take corrective action.

107. A fifth missed opportunity arose when, once the drug had been prepared in the saline bag, the MedChart was countersigned. Neither nurse rechecked the MedChart prescription at this point to ensure that they were signing for the correct drug. A sixth opportunity arose

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when a pharmacy technician specifically asked RN B to check the dose of the drug, as 20 ampoules seemed wrong. RN B confirmed that this was the correct dose.

Statements from RN C and RN B

108. RN C told HDC that the medication room was very crowded that morning, causing a lot of background noise. Mr A's condition was very concerning and he deteriorated very quickly, putting pressure on RN B and RN C to administer the medication. RN C said that nursing has become a lot more time constrained and stressful over recent years.

109. RN B told HDC that the factors she believes contributed to this error were the following:

- Both drugs have long pharmaceutical names starting with LEV;
- Both drugs have names that are difficult to pronounce;
- Because levetiracetam is hard to pronounce, it is commonly referred to on the ward by its brand name of "Keppra"; and
- In relation to the 20 ampoules needed to make up the dose, there are other medications made up on the ward using small doses. For example, an iron infusion can include up to 20 ampoules.

Discussion and conclusion

110. I acknowledge that there was time pressure because of Mr A's condition. I also accept my independent clinical advisor's advice that the drug having been moved from its normal place in a locked cupboard, to a shelf next to a similar-sounding drug was a clinical risk. I note that RN B made this same point.

111. However, in this case, it was only the beginning of the name of the drug that was similar, and the packaging for the drugs bore little resemblance to each other (the box containing levetiracetam was black and white and the box containing the levomepromazine was white, blue and red. The boxes are also different sizes). In my view, had either nurse read the name out loud, it would have been clear that they neither sounded the same, looked the same, nor were the same medication. Accordingly, in my view, the extent to which the names and placement of the drugs mitigates their error is limited.

112. I note that my advisor also stated that "staffing issues, being rushed to ensure [Mr A's] seizures were controlled, other patient priorities and an unfamiliarity with Levomepromazine are alluded to in the statements as potential confounders".

113. I accept that there were circumstances that contributed to this error. In addition, I consider that it is possible that confirmation bias played a role in which successive opportunities to be alert to the error were missed due to confidence in the initial confirming of the medication name. Even so, in my view, both RN C and RN B failed to comply with the DHB's Checking IV Medication and Fluids — IV Manual by not checking adequately that they had the correct drug in the treatment room/pre-administration check.

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114. In doing so, both nurses also failed to comply with the NZNO Guidelines for Nurses on the Administration of Medicines, in that they did not comply with the requirement to check that they had the "right medication".

115. These failures contributed to Mr A being administered the incorrect medication. Accordingly, I find that RN B and RN C breached Right 4(2) of the Code of Health and Disability Services Consumers' Rights (the Code).[23]

116. I also consider that in failing to identify the errors described above despite multiple further opportunities and/or red flags, RN B and RN C failed to provide Mr A's care with reasonable care and skill, and therefore I find that RN B and RN C breached Right 4(1) of the Code.[24]

Opinion: DHB/Te Whatu Ora — adverse comment

Introduction

117. Te Whatu Ora, as a healthcare provider, is obligated to provide care in accordance with the Code, and to support its staff adequately with policies and procedures.

118. Mr A presented to the public hospital after suffering from stroke-like symptoms. Mr A was also suffering from seizures, and on admission was prescribed levetiracetam, an anticonvulsant, to manage the seizures. The following day, RN B and RN C erroneously prepared and administered levomepromazine to Mr A. Mr A died of pneumonia three days later, following the overdose of levomepromazine.

Policy

119. The NZNO guideline on medication administration stipulates:

> "Where an agency policy requires a medicine to be checked by two people, the second person must ensure they undertake any calculations independently of the first person, where necessary witness administration of the medicine, and document they have checked and witnessed (where relevant) administration of the medicine in the medication chart.
>
> Employers must ensure a clear, written policy exists on who can prepare and check medicines for administration which takes into account the complexity of the medicine, the patient population and the context of the workplace. If such a policy does not exist, management must be informed."

[23] Right 4(2) states: "Every consumer has the right to have services provided that comply with legal, professional, ethical, and other relevant standards."
[24] Right 4(1) states: "Every consumer has the right to have services provided with reasonable care and skill."

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120. RN Sutton-Smith noted the effectiveness of independent double-checking in reducing medication errors. She quoted the following guidance from the Institute for Safe Medication Practices:

> "If the double check is conducted independently, it reduces the risk of confirmation bias that may occur if the same person prepares and checks a medication, as they likely will see only what they expect to see, even if an error has occurred. An independent double check requires two people to separately check the targeted components of the work process, without knowing the results of their colleague."

121. However, RN Sutton-Smith noted that often the practice of independent double-checking is poorly performed, or the correct steps in the process poorly followed.

122. The policy in place at the time of the event stated:

> "All intravenous (IV) medication and fluids **should be double-checked**[25] with either another authorised staff member or a competent other during the preparation period. This is termed the 'Treatment Room' check.
>
> Both staff involved in the check must carry out any drug calculations independently to help prevent error."

123. In my view, the policy at the time was unclear whether the independent double-check was specifically required at the Treatment Room check, or whether a double-check would suffice. I note that the policy has since been updated to stipulate that an independent check is needed throughout; however, I am critical of the DHB for the ambiguous and contradictory wording of its IV medication policy in place at the time.

Medication storage

124. The DHB's SAE review outlined that two contributory factors that led to this event were the layout of the medication in the medication room, and the sound-alike names of the two medications.

125. When RN B went to retrieve the levetiracetam, she first went to the lock-up drug cupboard, as in her experience levetiracetam was a medication that needed to be kept in the drug cupboard. RN B expressed her surprise to RN C that the levetiracetam was not in the locked cupboard, and she asked if they had run out. RN B was then informed by the pharmacy technician that it had been moved out of the cupboard and onto the injectable drug shelf.

126. RN B noted that in the medication room the medications are kept on shelves labelled with the name of the medication. She saw a medication beginning with "lev" on the shelf, and selected it believing it to be levetiracetam.

127. RN Sutton-Smith advised that the fact that the levetiracetam had been moved from its normal place in a locked cupboard to a shelf next to a similar-sounding drug was a clinical

[25] Emphasis added.

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risk, and that the potential for errors where medications are stored on a shelf alphabetically is high. I acknowledge this advice, and consider that the decision made by the DHB to move the levetiracetam to the shelf next to the levomepromazine was a contributory factor in this error.

128. However, I am not overly critical of this decision on the basis that these two medications only partially sound alike. Whilst they start with the same three letters, the rest of the words are quite different. I also note that they do not look alike, as the box containing levetiracetam was black and white and the box containing the levomepromazine was white, blue and red. The boxes are different shapes and the ampoules are different sizes.

Staffing — other comment

129. Statements provided by staff present on the day noted that they felt busier than normal. When staffing levels are lower than optimal it can create an environment where errors can be more prevalent. In his statement to the Police, Dr E noted that on the day Mr A was given the incorrect medication, it was very busy on the ward.

130. In addition, when Ms I called the ward after she became aware of a potential error, the call was answered but was hung up immediately. When she called a second time, she was put through to the Charge Nurse's phone, but this was not answered.

131. The DHB told HDC that the TrendCare data indicates that on Day 2 a variance response management nurse would not have been required on the ward for this shift.

132. Whilst neither RN B nor RN C indicated staffing issues as having contributed to what occurred, RN Sutton-Smith advised that it is clear that from the start of the shift there were some staffing issues, with additional stress in ensuring that all the patients assigned to RN B and RN C received an appropriate level of care. RN Sutton-Smith stated:

> "Inadequate nurse staffing for heavy patient loads are a significant contributory factor in patient safety and medication errors. Not only is [RN C] tasked with being an overall team leader, in a shift that begins with inadequate staffing, she has an increasingly agitated patient needing an urgent and increasing level of care."

133. In addition, RN Sutton-Smith noted that telephone calls made by the pharmacy in an attempt to intercept the error were not picked up on the ward. She stated:

> "It is troubling that a phone call made to a ward area (that could have potentially intercepted the error and saved the patient's life) was made, picked up by someone, but hung up straight away. It is not explained in any of the statements why this is so, but if this is also the result of a poorly staffed ward, this also requires acknowledgement by those in charge of the unit."

134. I agree. While I acknowledge that the DHB's TrendCare analysis indicated that there was no need for additional resourcing, some of the statements obtained in relation to this case indicate otherwise or at least poor behaviour in responding to calls, and I encourage the DHB to reflect on these comments.

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Pharmacy — other comment

135. Pharmacy staff tried to intercede to prevent the error. When Ms F felt that something was wrong, she spoke to a pharmacist, Ms H, who then tried to call the ward. Another pharmacist, Ms G, then went to the ward and pointed out the error to RN C.

136. RN Sutton-Smith commended the pharmacists who were involved in this error for doing all they could to try to prevent it.

137. I agree, and also commend the pharmacists for their attempts to alert the nurses to try to prevent the medication from being administered to Mr A.

Changes made since event

RN B

138. RN B told HDC that a direct change she made in response to what occurred relates to the words she uses when she and another registered nurse are checking medications together. A common practice when checking medications is for the first nurse to say the name of the medication to the second nurse. The second nurse then looks at the label on the medication to check the name. This is the practice she followed with RN C when the error occurred. She has changed her practice so that she no longer says the name of the medication when she is the first nurse, as she is now aware that this may influence the second nurse who is checking the medication. Now she simply asks the second nurse to check the medication she hands to them, or shows them the medication but does not say the name.

139. RN B told HDC that a few weeks after the incident, she attended a half-hour seminar at the hospital, on medication errors, how errors can occur and safety mechanisms that have been implemented, and continual review of safety systems, particularly in response to significant medication errors.

140. RN B also noted that after the event she completed the following courses:

a) Clinical calculations

b) Intravenous Therapy, Blood Product Administration

c) A new competency called “Medication safety”

d) A new competency called “Medication and fluid foundation 3”, which replaced the old competency

DHB

141. Immediately following the event, the Chief Nursing and Midwifery Officer contacted other DHBs via the national Lead Directors of Nursing Group to see if there was anything other DHBs were doing that the DHB had not thought of. The Quality Manager at the time followed

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up with the Health Quality and Safety Commission Medication Safety Clinical Lead to explore what other safety improvements could be implemented.

142. A systematic review shared with the DHB by the Medication Safety Clinical Lead at the Health Quality and Safety Commission outlines the continuing challenges faced in hospitals around processing medications, and notes that the effectiveness of double-checking medications in reducing adverse events is unclear. Despite independent double-checking being a widespread practice, there is limited empirical evidence to demonstrate a reduction in medication errors, and most commonly it is used for high-risk medications only, due to the resource-intensive nature of the independent double-checking practice. For this reason, the DHB explored effective system barriers that might be available for implementation. Such system barriers include adopting new technology such as bar coding and automated dispensing cabinets. These are being considered as part of the model of care work for the public hospital. The DHB told HDC that owing to internal and external limitations, both at a local and a national level, such technology cannot be introduced in the short to medium term.

143. The Chief Nursing and Midwifery Officer is leading work to implement Safety and Quality Walkabouts. The purpose of the walkabout is to strengthen inter-professional ways of working, allowing for discussion about safety concerns and identifying opportunity for quality improvement. Medication safety will be a key component of these walkabouts.

144. The DHB told HDC that an audit of the medication room was undertaken, with an initial stocktake of key aspects that affect patient safety with nursing medication administration. The DHB noted that there is further work to do in many areas. Not all aspects were audited in each area, and currently the audit has been undertaken on the public hospital site.

145. Following the incident, the DHB also approached the Health Quality and Safety Commission for advice on safe storage of medication, to ensure that there was no standardised evidence-based information on medication room layout that the DHB was not aware of.

146. After the event, the DHB updated the Checking IV Medications and Fluids Manual with the following:

> "All intravenous (IV) medication and fluids, which includes fluids used for haemodynamic monitoring, should be independently double-checked with either another authorized staff member or a competent other during the preparation period. This is termed the 'Treatment Room' check
>
> …
>
> Both staff involved in the check must carry out any drug calculations independently to help prevent error."

147. Te Whatu Ora told HDC that it continues to be in contact with Mr A's family, and is extremely grateful for their input into the DHB's investigation and the development of subsequent recommendations. Te Whatu Ora is in the process of completing a short video interview

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with Mr A's wife, so that the patient/whānau experience and learnings from this catastrophic error can be incorporated into Te Whatu Ora's medication safety education. Once this has been completed and the sharing consent processes have been completed, the video will be an invaluable learning tool for staff going forward.

148. In response to the provisional decision, Te Whatu Ora told HDC that it has taken this incident very seriously and continues to explore opportunities to reduce risk, including discussion with the national Lead Directors of Nursing Group and the Health Quality and Safety Commission medication safety clinical lead to explore other safety improvements that could be implemented.

Recommendations

149. As referred to above, since these events RN B has attended training and has completed many courses in relation to medication administration, and has provided Mr A's family with a written apology. I recommend that in addition, RN B report back to HDC on any medication errors that have occurred subsequently, and any further changes made to her practice, within four months of the date of this report.

150. I acknowledge that RN C is no longer practising. However, I recommend that she provide Mr A's family with an apology for her breach of the Code. The apology is to be provided to HDC within three weeks of the date of this report, for forwarding to Mr A's family.

151. I recommend that Te Whatu Ora:

a) Provide HDC with a further update on any changes made as result of these events. This information is to be sent to HDC within four months of the date of this opinion.

b) Undergo an audit of all medication errors and the compliance with Te Whatu Ora policy over a three-month period. Evidence of this and any further changes made as a result are to be sent to HDC within four months of the date of this opinion.

c) Evaluate its practice of independent double-checking, and the education given on how this process should look in clinical practice, and reflect on any changes it considers are required in the relevant policy. Evidence of this is to be sent to HDC within four months of the date of this opinion.

d) Ensure that the updated medication policy includes clear definitions of what an "independent double checking process" entails, and what checks are needed and when, and that the policy uses consistent language regarding "treatment room"/"pre-administration check" and "bedside check"/"administration check".

e) Consider the setup of safe medication storage, educational initiatives, investigation into medication management/storage systems, and initiatives to improve checking compliance and reduce human errors. Evidence of this is to be sent to HDC within four months of the date of this opinion.

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f) Evaluate the adequacy of staff education across Te Whatu Ora on the correct procedure for independent double-checking, and the 5+3 medication rights. Evidence of this is to be sent to HDC within four months of the date of this opinion.

Follow-up actions

152. A copy of this report will be sent to the Coroner.

153. A copy of this report with details identifying the parties removed, except the advisor on this case, will be sent to the Nursing Council of New Zealand, and it will be advised of RN B's and RN C's names in covering correspondence.

154. A copy of this report with details identifying the parties removed, except the advisor on this case, will be sent to the Health Quality and Safety Commission and MedSafe, and placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.

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Appendix A: Independent clinical advice to Commissioner

The following expert advice was obtained from RN Lynsey Sutton-Smith:

"I, **Lynsey Sutton-Smith** (MNclin, RNdip) have been asked to provide an opinion to the Commissioner on case number **21HDC01173.**

I have read and agree to follow the Commissioner's Guidelines for Independent Advisors.

I am a Clinical Nurse Specialist working within an urban tertiary level Intensive Care Unit (ICU). I qualified in the UK in 1996 and have worked in the ICU at my current DHB for 16–17 years. I am a senior expert RN practising as a Clinical Nurse Specialist (CNS) with extensive experience in ICU nursing, achieving Masters in Nursing in 2012. I am also a part time PHD student with the University of Otago researching long term outcomes for critically ill patients and 'Post Intensive Care Syndrome'. I have published several papers in the medical & nursing literature around clinical practice quality improvement projects and have a clinical interest in quality of care, audit, and research in the Intensive Care Unit.

Expert advice requested:

Advice on the nursing care provided by [RN B] and [RN C] to [Mr A] [in 2018].

Please comment on:

1. The appropriateness of the medication administration steps carried out by the RNs.
2. The reasonableness of using 20 vials of a medication to make up the correct dosage.
3. The observations/monitoring of [Mr A] during the medication administration.
4. The steps taken when the error was identified and following the incident.
5. Any other matters in this case that you consider warrant comment.

The following documentation has been provided by the HDC and has been reviewed:

- Complaint documentation 27/5/21
- RN responses
- Police statements from all relevant people involved
- [DHB] medication policy
- Process around training for medication administration and process in general around medication prescription and administration from [the] charge Nurse Manager (CNM).

Background to the complaint:

[Mr A] had a fall, [Mr A's] wife noted that he suffered a black eye and lump on his head. [Mr A] was admitted to [the public hospital] on [Day 1]. That evening he began to have

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seizures leading to [Dr D] prescribing 500 milligrams in five mls of Levetiracetam. On [Day 2] [RN B] and [RN C] prepared [Mr A's] medication. In error, they selected Levomepromazine instead of Levetiracetam. To make up the correct quantity of the medication, they drew up 20 ampoules of the medication and added this to a 200-ml bag of normal saline for infusion to run over an hour via an infusion pump. During the infusion it was discovered that Levomepromazine was being administered instead of Levetiracetam. The infusion was stopped halfway through. [Mr A] was transferred to the intensive care unit with an altered level of consciousness and on [Day 5] [Mr A] died. The postmortem identified the cause of death was due to pneumonia following overdose with an incorrect medication.

Comment on the appropriateness of the medication administration steps carried out by the RNs and the reasonableness of using 20 vials of a medication to make up the correct dosage:

Summary

- [RN C] was in her role as team leader of team 1 at the time of the medication error. Usually, there is a staffing model of one RN, resource RN, an EN (enrolled nurse), an HCA and a 'special' watch nurse. [RN C] starts her shift with only herself and an EN and requests more help from her ACNM. A resource RN and a special arrive on shift. [RN C] allocates herself 3 patients, including [Mr A]. Later [RN B] would start her shift as a supernumerary RN on a back to work programme.

- [RN C] takes a diligent handover which includes clinical history, information leading to [Mr A's] hospitalisation, his current clinical issues, and the medications he has been prescribed. It is stated that the handover verbalised [Mr A's] medications as IV diazepam and IV Keppra* (levetiracetam). The provided written handover sheet clearly states the word 'Keppra'. It is unclear from the written statement if verbally this drug was handed over as Keppra as its trade name but appears to imply so. However, Keppra is referred to routinely in my area of practice also. ***Keppra is the trade name for Levetiracetam.***

- [RN C] goes on to read the notes for all her patients and checks [Mr A's] electronic MedChart. She notes Levetiracetam was due at 10am.

- When she attends [Mr A's] room, [RN B] is present, and both note he has increased agitation and seizure activity. [RN C] diligently records [Mr A's] vital signs and approaches the medical team for a medical review. Both [RN C] and [RN B] discuss [Mr A's] increasing need for a constant bedside watch. [RN B] stays with [Mr A] throughout the medical review. An HCA arrives to watch [Mr A] and both [RN B] and [RN C] leave the room to organise the medications. [Mr A's] wife also arrives to sit with him.

Medication preparation process:

- This occurs in the ward's medication preparation area.

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- [RN B] logged into [Mr A's] electronic MedChart in mid prep of Diazepam.

- [RN C] draws Diazepam up.

- At the same time as [RN C] is drawing up Diazepam, [RN B] is starting to prepare Levetiracetam by locating it in the locked cupboard where she remembers it is normally found. However, she is told by the pharmacy technician (who is restocking the stock levels) that it is now located in the shelf under L (next to Levomepromazine).

- *Moved from its normal place in a locked cupboard and instead moved to a shelf next to similar sounding drug. This is a clinical risk.*

- [RN B] picks up a box reading 'Lev' and assumes this to be [Mr A's] prescribed medication of Levetiracetam. The drug box is checked with [RN C]. Neither RN looks at/checks the name of the drug on the box properly or in conjunction with the prescription/MedChart.

- *This is the first missed opportunity that would have intercepted the medication error. It is not stated vebatim in the statements by [RN C] or [RN B], why they both misread the box assuming the drug to be the correct medication. However staffing issues, being rushed to ensure [Mr A's] seizures were controlled, other patient priorities and an unfamiliarity with Levomepromazine are alluded to in the statements as potential confounders. With that said, because neither of them checked the box they had picked up against the MedChart prescription, they both continue to think they have the correct drug in hand. This one action would have most certainly prevented this error. This is a significant departure from the policy.*

- Both RNs then go on to check the box of what they believe to be Levetiracetam, against a prescription for Levetiracetam on a laptop. It is clear why there was a discrepancy with the dose noted on the box and the information they are reading on the laptop, both different drugs from each other. They did note the medication they were holding, were small glass ampoules containing 25 mgs, and which is different to the usual dose and preparation of Levetiracetam, usually presented in 500 mgs bottles.

- *There are a further two opportunities here that should have triggered a warning sign and corrective action as to the incorrect drug being prepared. If they had gone back to the 5+3 rights of medication administration, no 2: check the right medication against the prescription, they would have again intercepted the error. Noting a strange dose on the ampoules of the medication they were holding, should also have triggered a pause and check opportunity.*

- [RN C] proceeds to go to the other medication room to get the remaining ampoules that would be needed to make up the dose (20 ampoules). [RN B] comments that she knows that using 20 ampoules to make up a medication is unusual but was under

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the impression that with recent changes to medication supply, sometimes lower doses could only be dispensed requiring many more ampoules to be needed of certain drugs.

- *This is another missed opportunity that should have triggered a warning sign and corrective action. Whilst I acknowledge rarely, medication doses may need to be prepared using multiple ampoules, 20 ampoules to make up a dose is excessive. It is normal standard of practice, when multiple ampoules are needed to make up a drug, a warning trigger leads the RN to check that the drug dose, drug type and prescription is correct before proceeding. This would be considered standard of practice.*

- Both [RN B] and [RN C] proceed to check all the ampoules to make sure they were 'all the same medication'. [RN C] states that in hindsight they did not properly check the ampoules and were more focussed on the expiry date than the drug name.

- *This was again another missed opportunity for corrective action, for one of them to notice it was not Levetiracetam.*

- Once the drug was prepared in a saline bag, the MedChart is countersigned. Neither RN rechecks the MedChart prescription whilst they are signing, to check they are signing for the correct drug.

- *This is another missed opportunity for corrective action.*

- Both [RN B] and [RN C] attend the patient's room with the laptop (prescription) and prepared medications. They accurately identify the correct patient, by checking [Mr A's] wrist band and the medications are administered firstly Diazepam and then Levetiracetam.

- [RN C] senses something is wrong with the infusion rate/route and stops the infusion halfway through. It is only when the medical team attend the patient, that the medication error is made explicit, only then [RN C] realising it was in fact the wrong medication not the wrong route.

Statements from the pharmacist(s) — summary points

The Pharmacy technician [Ms F] overhears a conversation between [RN C] and [RN B] in the drug room, discussions around where to find more Levomepromazine. The pharmacy technician asks [RN B] to consider checking the dose and checking it has been charted properly, sensing that 20 vials to make up a drug felt 'wrong'. Unfortunately, [RN B] affirms the dose is correct and does not take [Ms F's] concerns further.

- *This again represents another failure to check the drug, chart, prescription and ampoules used.*

However, and clearly sensing something is not quite right, [Ms F] takes this conversation back to her pharmacy colleagues ([Ms I]), who realising the gravity of the situation,

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locate the patient, and try to intercept the error with a phone call to the CNM and a general ward number. Unfortunately, by the time pharmacists ([Ms G] and [Ms H]) arrive on the ward and spoke to [RN C], the medication had been given. I want to commend the pharmacists who were involved in this error for doing all they could to intercept it, however, to be mindful not to assume mistakes in the future will always be picked up by that second checker. Always follow up on anything that does not seem right (I acknowledge this is a rare event).

Comment on the observations/monitoring of [Mr A] during the medication administration and the steps taken when the error was identified and following the incident:

From the statements provided by [RN C] and [RN B] it appears [Mr A] did have an appropriate and adequate amount of observation during the period of medication administration. [RN B] and the allocated HCA special were both assigned to care for [Mr A], and they were both giving him a bed bath in the room with him.

[RN B] states that once the infusion of medication was started, [Mr A] had become more unresponsive and his seizures ceased, observations she puts down to the diazepam working effectively. This is a reasonable assumption at the time (only with hindsight we understand this to be the effect of oversedation from the Levomepromazine).

On realizing a potential error, [RN C] rapidly attends and stops the infusion. This is absolutely the priority and correct action. However, unfortunately still it is not clear to [RN C] as to the true extent of the medication error. This was uncovered by [Dr E].

It is unclear if the steps taken to stabilize [Mr A] are the result of the medical team arriving in his room for rounds or by [RN C] escalating concerns upon realizing an error. The statements are not clear what came first and so I cannot make comment on the escalation of care by whom. However, the subsequent steps taken to stabilize [Mr A] were in line with recommended practice and appropriate (i.e, assess patient, obtain 12-lead ECG, Vital signs in conjunction with airway and breathing support and resuscitation). He was rapidly transferred to ICU which was an appropriate final step.

What is the standard of Care?

The 5+3 rights of medication administration are very clear and outline every step of the medication preparation, administration, and post evaluation phase (see Appendix). In particular, the medication right no 2; ■ '**Check the name,** strength and form **of the physical medication against the medication prescribed on the medication chart**' clearly outlines which step was not undertaken by either [RN C] or [RN B]. All of the 5+3 rights of medication administration are considered minimum standard of care and responsibility lies with both RNs to do so independent of each other. This is a significant deviation of the standard of care.

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What is New Zealand Nurses Organisation policy on medication administration?

'While many medicines can be prepared for administration by an individual regulated nurse, e.g. tablets that are not controlled drugs, many agencies require some medicines, particularly intravenous (IV) medicines for administration including blood products, and immunisations to be checked by two regulated nurses. It is important to check your individual agency's policies for specific information on who can check medicines.

Where an agency policy requires a medicine to be checked by two people, the second person must ensure they undertake any calculations independently of the first person, where necessary witness administration of the medicine, and document they have checked and witnessed (where relevant) administration of the medicine in the medication chart.

Employers must ensure a clear, written policy exists on who can prepare and check medicines for administration which takes into account the complexity of the medicine, the patient population and the context of the workplace. If such a policy does not exist, management must be informed.'

https://www.nzno.org.nz/Portals/0/publications/Guideline%20-%20Guidelines%20for%20Nurses%20on%20the%20Administration%20of%20Medicines%20(002).p df?ver=72ENNovp.19HIYkn-7-Fcjw%3d%3d

[DHB] Policy:

The [DHB] policy clearly outlines the process for ensuring the five rights of medication administration are followed. The policy clearly states such as who is responsible (1. Authorised staff and another competent other) which both [RN C] and [RN B] are, and the pre-administration checks required (no 8) 'fluids/medication, volume and rate against the prescription' and also covered in the administration check: 'at the patient bedside prior to administration, the following should be checked comparing the IV fluid or medication chart and the wristband to ensure the right patient, right medication, right dose, right route, right time, correct equipment, patient allergy status, I.V inspection and when the drug was last given.' It is these steps in the policy that were not adhered to. This is a significant deviation from the standard of care and the policy.

Independent Double-checking procedure:

Both [RN C] and [RN B] are responsible for ensuring an independent double check is completed. The policy clearly outlines 'effective and safe verification of I.V medications and fluids demands an independent, focused, double-checking process involving 2 I.V authorized staff or one authorized and one competent other'. It is clear from the statements that this independent double check process was not followed. This is a significant deviation from the policy. A resource obtained from the Information for safe medication practices online website (ISMP) outlines the effectiveness of this process in reducing medication errors.

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'If the double check is conducted independently, it reduces the risk of confirmation bias that may occur if the same person prepares and checks a medication, as they likely will see only what they expect to see, even if an error has occurred. An independent double check requires two people to separately check the targeted components of the work process, without knowing the results of their colleague. However, the practice of independent double checking is often poorly performed, or the correct steps in the process poorly followed.' I recommend the practice of independent double checking be evaluated in [the DHB] and education given on how this process should look in clinical practice (maybe a step-by-step guide, possible simulation-based training as part of the existing I.V therapy education package).

https://www.ismp.org/resources/independent-double-checks-worth-effort-if-used-judiciously-and-properly

Other potential contributory aspects: Staffing

Both RNs' care of [Mr A] up to this point is appropriate and responsive to his clinical status. However, it is clear from the start of the shift, there are some staffing issues with additional stress securing watches/specials to ensure all the patients assigned to them had an appropriate level of care. Inadequate nurse staffing for heavy patient loads are a significant contributory factor in patient safety and medication errors. Not only is [RN C] tasked with being an overall team leader, in a shift that begins with inadequate staffing, she has an increasingly agitated patient needing an urgent and increasing level of care. I see TrendCare is mentioned in the statement by [the] shifts Associate Charge Nurse Manager (ACNM) that it is utilised. It doesn't specify what the variance was on that shift that could have indicated an increased need for staffing based on acuity.

Unfortunately, it is also alluded to later during the medication error that phone calls made to intercept the error by pharmacy were not picked up on the ward. It is troubling that a phone call made to a ward area (that could have potentially intercepted the error and saved the patient's life) was made, picked up by someone, but hung up straight away. It is not explained in any of the statements why this is so, but if this is also the result of a poorly staffed ward, this also requires acknowledgement by those in charge of the unit.

Storage of medications:

The potential for errors where medications are stored on a shelf alphabetically is high. It is essential that the Levetiracetam was placed back into the locked cupboard at the time the medication error was discovered. However, the clinical risk for similar medication errors in the future remains.

Many DHBs are using a PYXIS based system, where medications are all stored electronically. A system that can interact with MedChart would be an effective (albeit costly) solution (especially if the nurses can only access the medications prescribed). I am not sure if the MedChart system can communicate with a system such as PYXIS but given technology-based systems are frequently being used worldwide, would suggest

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[the DHB] investigate this to support the already rolled out electronic prescribing MedChart system.

One can see the benefits of the MedChart prescribing system, which would undoubtedly reduce prescribing errors. However, in the situation of medication preparation and administration errors, the process is entirely dependent on the nurses to perform independent, diligent checks, at all stages of the medication preparation and administration process focussing on ALL the medication rights as per the policy. In this situation it is the human error component that has led to this medication error.

I see in the notes provided to me for this review there is an insert on the 'open for better care, recognising human factors and strategies for preventing errors'. If this was a new initiative because of this error, please continue this work. However, it is not clear exactly what has been actioned from the notes I have.

Overall Recommendations

1. If [the DHB] does not already have a dedicated multi-disciplinary working group with champions across all acute ward areas set up, I suggest this be done (if not already). Safe medication storage, education initiatives, investigation into medication management/storage systems, and initiatives to improve checking compliance and reducing human errors could be the focus (acknowledging these are longer term projects).

2. Education across [the DHB] on the correct procedure for independent double checking, and the 5+3 medication rights. Perhaps this could be simulation based, focussed on all inpatient areas. This needs to be implemented now if it is not already or re-evaluated/updated if it is already.

3. [The DHB] has a responsibility to ensure TrendCare is used appropriately, and poorly staffed wards have the staffing resources they require to safely care for patients.

Final comments:

This is a devastating event for not only [Mr A's] family, but the staff also involved, specifically [RN C] and [RN B]. Firstly, my deepest condolences go to [Mr A's] family and hope they can achieve some comfort in the future. Secondly, I hope that [RN C] and [RN B] are/have been offered adequate support through this process of investigation. Unfortunately, one can only imagine how traumatic it would be for them also.

Yours Sincerely

Lynsey Sutton-Smith (MNclin, RNdip)"

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Appendix B: Relevant guidelines

NZNO Guidelines for Nurses on the Administration of Medicines

"4.3.3 Preparing and checking medicines for administration

While many medicines can be prepared for administration by an individual regulated nurse, eg tablets that are not controlled drugs (see section 7.1 on controlled drugs), many agencies require some medicines, particularly intravenous (IV) medicines for administration including blood products, and vaccines, to be checked by two regulated nurses (please see sections 7.2 & 7.5). It is important to check your individual agency's policies for specific information on who can check medicines.

Where an agency policy requires a medicine to be checked by two people, the second person must ensure they undertake any calculations independently of the first person, where necessary witness administration of the medicine, and document in the medication chart that they have checked and witnessed (where relevant) administration of the medicine.

Employers must ensure a clear, written policy exists on who can prepare and check medicines for administration. The policy must take into account the complexity of the medicine, the client population and the context of the workplace. If such a policy does not exist, management must be informed."

10.2 Prior to administration

"Prior to administration of medicine, the regulated nurse … administering the medicine checks the five rights + three: the right medicine in the right dose must be administered to the right person at the right time by the right route."

[DHB] Checking IV Medication and Fluids — IV Manual (policy at … 2018)

"**Checking IV Medication and Fluids — IV Manual ([DHB])**

This information, which forms part of the IV Manual ([DHB]), instructs staff on how to ensure fluids and medications are checked in a safe, consistent and standardised manner.

This document has undergone consultation across the organisation but its content applies to [the DHB] only.

Associated Policy:	Intravenous Policy Principles — IV Manual ([DHB]) ([#])
Treatment Room Check	All intravenous (IV) medication and fluids should be double-checked with either another authorised staff member or a competent other during the preparation period. This is termed the 'Treatment Room' check.

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Both staff involved in the check must carry out any drug calculations independently to help prevent error.

It is acknowledged that for some areas, e.g. community services, PACU (see Intravenous Policy Principles — IV Manual ([DHB]) ([#])) double-checking may be difficult to achieve. In these cases the options include:

- Completing a careful single-person check.
- Utilising suitable adult patient/family members to verify basic medication details.
- Completing some aspects of the check, e.g. drug calculations, with another staff member prior to leaving the base office.

Bedside Check

IV fluid and medications that must have a 'second check' at the bedside include:

- **Blood components and products**
- **Controlled drugs**
- **Medication for epidural administration**
- **High risk** medications which include:
    - **Insulin products**
    - Heparin and weight based low molecular weight heparin
    - Potassium chloride or potassium phosphate (IV piggy-back >20mmol)
    - Concentrated NaCl (3% or higher)
    - Calcium, magnesium and iron infusions
    - Neuromuscular blockers
    - Parenteral nutrition (PN)
    - **Cytotoxics:** IV,PO,IT,IP

All IV medications that involve calculations based on body weight and are administered via infusions pumps.

It is [DHB] policy that all HIGH-risk IV medications and fluids must be checked by two authorised/one authorised and one competent other at the bedside, in an uninterrupted process, following an independent double checking process. A permanent record is maintained by both personnel legibly signing the medication chart.

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IV Check Procedure

Responsible	Actions	
	Pre-administration Check	
Authorised / Competent Other	1.	Administrator is appropriately certificated.
	2.	Correct medication chart for the patient.
	3.	Medication / fluids are prescribed correctly.
	4.	Prescription legible and signed by medical officer.
	5.	Relevant observations are documented as indicated.
	6.	The time last dose given, if applicable.
	7.	Allergy history status.
	8.	Fluids / medication, volume, and rate against the prescription.
	9.	Right diluent and right volume.
	10.	Expiry date of the fluids / medication.
	11.	No leakage or contamination of the fluids, i.e. colour and clarity and no precipitates. (If abnormalities are detected, the bag must be kept and reported to the manufacturer following Clinical Devices: Faults, Recalls + Alerts (District) ([#]). Complete an incident form and product fault form. If it is a medication that is faulty then report this to [the DHB] Pharmacy Department.)
	12.	Appropriate equipment has been assembled and is functional. All electrical equipment being used for fluid and medication administration must have an **annual** service check.

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	Administration Check	
	1.	At the patient bedside prior to administration, the following should be checked, comparing the IV fluid or medication chart and the wristband: ■ Right patient ❑ ■ Right medication ❑ ■ Right dose/rate ❑ ■ Right route ❑ ■ Right time ❑ ■ Correct equipment ❑ ■ Patient allergy status ❑ ■ IV cannula site inspection ❑ ■ When drug was last given ❑
		Note: Whenever possible there should be a discussion with the patient about the drugs to be administered.
	2.	Identify patient — ask the patient to state their name and date of birth.
		Note: Do not prompt them by using their name.
Second Checker	3.	Document your signature on the appropriate medication chart as evidence you have undertaken the second check.

Associated Documents:

- Clinical Devices: Faults, Recalls + Alerts (District) (16270)
- IV Manual [DHB]

References:

- Intravenous Nursing New Zealand (INNZ). 2012. *Provisional Infusion Therapy Standards of Practice 2012* http://www.ivnnz.co.nz/about-ivnnz-inc./Infusion-Standards-of-Practice; http://www.ivnnz.co.nz/about-ivnnz-inc./Infusion-Standards-of-Practice
- Health Practitioners Competence Assurance Act 2003
- Nursing Council of New Zealand. 2011. Standards and guidelines for nurses http://nursingcouncil.org.nz/Publications/Standards-and-guidelines-for-nurses

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- Nursing Council of New Zealand: Guideline responsibilities for direction and delegation of care to enrolled nurses http://nursingcouncil.org.nz/Nurses/Scopes-of-practice/Enrolled-nurse

[DHB] Checking IV Medication and Fluids — IV Manual (February 2021)

Checking IV Medication and Fluids — IV Manual ([DHB])

This information instructs staff on how to ensure fluids and medications are checked in a safe, consistent and standardised manner.

This document is part of the electronic IV Manual ([DHB]).

Associated Policy: Intravenous Policy Principles — IV Manual ([DHB])

Treatment room check

All intravenous (IV) medication and fluids, which includes fluids used for haemodynamic monitoring, should be independently double-checked with either another authorised staff member or a competent other during the preparation period. This is termed the 'Treatment Room' check.

Both staff involved in the check must carry out any drug calculations independently to help prevent error.

It is acknowledged that for some areas, e.g. community services, PACU (see **Intravenous Policy Principles — IV Manual ([DHB])** independent double-checking may be difficult to achieve. In these cases, the options include:

- Completing a careful single-person check.
- Utilising suitable adult patient/family members to verify basic medication details.
- Completing some aspects of the check, e.g. drug calculations, with another staff member prior to leaving the base office.

All checks need to be done in a focused, distraction-free environment.

Bedside check

IV fluid and medications that must have a 'second check' at the bedside include:

- **Blood components and products.**
- **Controlled drugs.**
- **Medication for epidural administration.**

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- All IV medications that involve calculations based on body weight and are administered via infusions pumps, e.g. inotropes.
- **Other high risk** medications may include:
    - **Insulin products**
    - Heparin and weight-based low molecular weight heparin
    - Potassium chloride or potassium phosphate (IV piggyback >20mmol)
    - Concentrated NaCl (3% or higher)
    - Calcium, magnesium, and iron infusions
    - Neuromuscular blockers
    - Parenteral nutrition (PN)
    - **All cytotoxics medication**

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Note: It is [DHB] policy that all **high-risk** IV medications and fluids **must** be checked by two authorised staff (or one authorised and one competent other) at the bedside in an uninterrupted process, following an independent double-checking process. A permanent record is maintained by both personnel legibly signing the medication chart or MedChart.

Responsible	Actions	
IV Check Procedure **Authorised staff and another** 1. **Authorised** **or** 2. **Competent other**	**Pre-administration Check**	
	1.	Administrator is appropriately certificated.
	2.	Correct medication order for the patient.
	3.	Medication / fluids are prescribed correctly.
	4.	Prescription is legible and signed by a medical officer or on MedChart.
	5.	Relevant observations are documented as indicated.
	6.	The time last dose given, if applicable.
	7.	Allergy history status.
	8.	Fluids / medication, volume, and rate against the prescription.
	9.	Right diluent and right volume.
	10.	Expiry date of the fluids / medication.
	11.	No leakage or contamination of the fluids, i.e. colour and clarity and no precipitates. (If abnormalities are detected, the bag must be kept and reported (16270). Complete an incident form on Safety1st and product fault If it is a medication that is faulty, then report this to [the DHB] Pharmacy Department.
	12.	Appropriate equipment has been assembled and is functional. All electrical equipment being used for fluid and medication

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	Administration Check	
	1.	At the patient bedside prior to administration, the following should be checked, comparing the IV fluid or medication chart and the wristband: • Right patient • Right medication • Right dose/rate • Right route • Right time • Correct equipment • Patient allergy status • IV cannula site inspection • When drug was last given **Note:** Whenever possible, there should be a discussion with the patient about the drugs to be administered.
	2.	Identify patient — ask the patient to state their name and date of birth. **Note:** Do not prompt them by using their name.
Both Staff	3.	Document your signatures on the appropriate medication chart or MedChart as evidence of independent double checking.

Associated Documents:

- Clinical Devices: Faults, Recalls + Alerts (District) ([#])

References:

- Health Practitioners Competence Assurance Act 2003
- Nursing Council of New Zealand. 2011. *Standards and guidelines for nurses*; Wellington; http://nursingcouncil.org.nz/Publications/Standards-and-guidelines-for-nurses
- Nursing Council of New Zealand: *Guideline responsibilities for direction and delegation of care to enrolled nurses*; http://nursingcouncil.org.nz/Nurses/Scopes-of-practice/Enrolled-nurse

General Notes

Scope of Practice: Ensure you are fully qualified to perform the role specified in any document.

Deviations: If you need to deviate from any procedure, policy, or guideline, make notes and follow up.

Caution — Printed Copies: Printed copies of this document cannot be relied on after the date at the bottom of the page. Check release date and version number against the electronic version on MIDAS to ensure that they are current.

Disclaimer:This document meets [the DHB's] specific requirements. [The DHB] makes no representations as to its suitability for use by others, and accepts no responsibility for the consequences of such use."

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