

Clinical significance of IV medicine incidents

Page 1: Instructions

Thank you for agreeing to help rate the clinical significance of a range of incidents in the preparation and administration of injectable medicines. These results will be used to assess the effectiveness of changes made to the NHS Injectable Medicines Guide (“Medusa”) as part of a study funded by the National Institute for Health Research. If these changes are found to be effective, their implementation will help to improve the safety of intravenous medicines in hospitals across the country.

On the following pages are brief descriptions of 85 incidents in the preparation and administration of injectable medicines which resulted in patients not receiving their medication as intended by either the prescriber, or hospital policies and guidelines.

Please could you rate the **potential clinical significance** of each of these incidents. The rating scale runs from zero to ten, where zero should be given to an incident which will have no effects on the patient and ten should be given to an incident that would result in death. Select the appropriate box to indicate your rating for each incident.

Please assume that all patients are **adults** on a **general medical or surgical ward**. As a full clinical history is not available for each patient, please use your judgement to rate the potential clinical significance for a **typical patient** in each situation.

Please note that **the survey is not saved automatically**. When you have rated all the incidents, please **click the finish button** at the end of the last page, otherwise your answers will not be saved. If you wish to save your responses and finish the survey later, please click on the **Finish later** option at the bottom of each page. This will take you to a new page with a link you can save to come back to your partly completed survey.

I have asked staff from different disciplines to take part, so that a wide range of health care professionals are represented. Your responses are therefore important, so please rate the cases yourself.

All individual responses will be stored securely and confidentially at the University of

Bath and will not be shared outside of the research team. After ten years they will be securely destroyed. Your responses will be pooled with those of other health care professionals to produce an average score for each case which may be published in reports to the NHS, research journals or at conferences.

Please complete all your responses by 2nd September. I will then arrange for a £50 Amazon voucher to be sent to you by email, to thank you for your time.

If you have any questions please do not hesitate to contact me on XXXXX XXXXXX or by email: M.D.Jones@bath.ac.uk.

Many thanks for your help. Best wishes,

Matthew.

Page 2: Part 1 - incidents involving various medicines

Please rate the **potential clinical significance** of each of the following incidents. Assume that all patients are adults on general medical or surgical wards. As a full clinical history is not available for each patient, please use your judgement to rate the potential clinical significance for a typical patient in each situation.

A patient should have been given 2 g vancomycin IV diluted in 500 mL of sodium chloride 0.9%. Instead it was diluted in 250 mL of sodium chloride 0.9%.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

A patient was prescribed 35 mg esmolol by IV injection over 1 minute, but instead was given 3.5 g (3500 mg) esmolol.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3

- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

A patient prescribed 5 mg morphine IV was given intravenously 5 mg of Oramorph (oral morphine solution 10 mg/5 mL) solution.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

A patient was prescribed vancomycin 1 g twice daily by IV infusion over 2 hours. One dose was given by short injection rather than by infusion.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2

- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

A patient with venous thromboembolism was prescribed an IV infusion of unfractionated heparin at a rate of 200 units/hour, but instead the rate was set to 1300 units/hour for several hours.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 3: Part 1 - incidents involving various medicines

Please rate the **potential clinical significance** of each of the following incidents. Assume that all patients are adults on general medical or surgical wards. As a full clinical history is not available for each patient, please use your judgement to rate the potential clinical significance for a typical patient in each situation.

A patient was prescribed 20 micrograms fentanyl IV diluted in glucose 5%, but instead the drug was diluted in sodium chloride 0.9%.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

A patient was given an IV infusion of sodium chloride 0.9% at a rate of 5 mL/hour. This infusion had not been prescribed.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3

- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

A 100 units/mL unfractionated heparin infusion was prepared and correctly labelled in the pharmacy. However, on the ward a second label was added including the name of a different drug.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

A patient was prescribed cefotaxime 1 g IV three times a day for postpartum pyrexia. One dose was reconstituted with 10 mL of 15% potassium chloride solution instead of 0.9% sodium chloride. The dose was then administered by short IV injection.

- ☐ 0 - no effects

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

1 litre sodium chloride 0.9% with 20 mmol potassium chloride was prescribed for IV infusion over 12 hours. The documented start time was 23:25. At 13:00 the following day the infusion was not running and 150 mL remained. The infusion should have been completed, but the pump was not plugged in and the battery was flat.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 4: Part 1 - incidents involving various medicines

Please rate the **potential clinical significance** of each of the following incidents. Assume that all patients are adults on general medical or surgical wards. As a full clinical history is not available for each patient, please use your judgement to rate the potential clinical significance for a typical patient in each situation.

A patient was prescribed an IV infusion of sodium chloride 0.9% at a rate of 5 mL/hour, but instead it was given at a rate of 3 mL/hour.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

A patient who was severely volume depleted was prescribed an an IV infusion of sodium chloride 0.9% at a rate of 250 mL/hour, but instead it was given at a rate of 20 mL/hour for several hours.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2

- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

A patient was prescribed and given an amiodarone infusion of 900 mg over 24 hours. A decision was then made not to continue this treatment. However, five days later they were given an amiodarone infusion at a rate of 30 mg/hour, which had not been prescribed.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

A patient was prescribed soluble insulin 10 units every six hours. This was initially interpreted as 10 mL (1000 units), but the mistake was realised and the injection stopped after 2 mL (200 units) had been given.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

A patient was being treated for acute sciatica by lumbar epidural injection of methylprednisolone acetate. The vial of drug was reconstituted with 30% sodium chloride instead of 0.9% sodium chloride and then given.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 5: Part 2 - incidents involving voriconazole (reconstitution)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

Hospital policy and the IV guide state that when reconstituting IV medicines, they should be allowed to dissolve completely before drawing up the required dose. However, in the following incidents this did **not** occur. In all cases, the solution administered to the patient was clear and free of particles.

	0 - no effects	1	2	3	4	5	6	7	8	9	10 - death
The drug solution was cloudy when drawn up	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The drug solution was cloudy when drawn up & some undissolved powder remained in the vial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The drug solution was cloudy when drawn up & a significant quantity of undissolved powder remained in the vial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Some undissolved powder remained in the vial (solution clear when drawn up)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The IV guide states that when reconstituting voriconazole, the vial should **not** be shaken, but should be swirled instead. However, when preparing a dose of voriconazole, the vial was **shaken** until the powder had dissolved.

☐ 0 - no effects
 ☐ 1
 ☐ 2
 ☐ 3

- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

The IV guide states that when reconstituting voriconazole, the vial should **not** be shaken, but should be swirled instead. However, when preparing a dose of voriconazole, the vial was **shaken briefly** and then swirled until the powder had dissolved.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

The product license and IV guide state that voriconazole injection should be reconstituted with **19 mL** of water for injections or sodium chloride 0.9%. However, a dose of voriconazole was reconstituted with **34 mL** instead.

- ☐ 0 - no effects

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

The product license and IV guide state that voriconazole injection should be reconstituted with **19 mL** of water for injections or sodium chloride 0.9%. This volume was correctly measured, but only **13-15 mL** injected into the voriconazole vial to dissolve the drug powder.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that when reconstituting an IV medicine, the syringe and needle

should remain inserted into the vial whilst the drug powder dissolves. However, whilst preparing a dose of voriconazole, the syringe and needle were removed from the vial and later reinserted.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 6: Part 2 - incidents involving voriconazole (needle changes)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

Hospital policy states that when reconstituting an IV medicine, the needle should be changed between drawing up the reconstituting fluid and injecting it into the drug vial. However, this did **not** happen when preparing a dose of voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that when preparing an IV medicine, the needle should be changed between reconstituting the drug and drawing up the required dose. However, this did **not** happen when preparing a dose of voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 7: Part 2 - incidents involving voriconazole (dose and drug)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

The patient was prescribed a 360 mg (6 mg/kg) loading dose of voriconazole. However, in the following incidents a different dose was administered:

	0 - no effects	1	2	3	4	5	6	7	8	9	10 - death
288 mg (20% less than prescribed)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
320 mg (11% less than prescribed)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
328 mg (9% less than prescribed)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
340 mg (6% less than prescribed)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

400 mg (11%
more than
prescribed)



The patient was prescribed 360 mg of voriconazole, but was given 360 mg of an antibiotic instead. Please rate this incident based on what you consider to be a typical antibiotic.

☐ 0 - no effects

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6

☐ 7

☐ 8

☐ 9

☐ 10 - death

A dose was prepared using voriconazole vials which had expired 18 months ago.

☐ 0 - no effects

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6

☐ 7

- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 8: Part 2 - incidents involving voriconazole (dilution)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

According to the product license and hospital IV guide, the reconstituted voriconazole should have been diluted with sodium chloride 0.9% or glucose 5%. Instead, it was added to a ready-made infusion bag of metronidazole 500 mg in 100 mL.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

According to the product license and hospital IV guide, the reconstituted voriconazole should have been diluted to a concentration <5 mg/mL. However, it was diluted to a concentration of **6.1 mg/mL**.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

According to the product license and hospital IV guide, the reconstituted voriconazole should have been diluted to a concentration >0.5 mg/mL. However, it was diluted to a concentration of **0.36 mg/mL** in a 1000 mL infusion bag and infused over 3 hours.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that the infusion bag should have been inverted at least 5 times after adding the voriconazole solution, in order to mix the solution. However, in the following incidents the bag was inverted fewer times:

	0 - no effects	1	2	3	4	5	6	7	8	9	10 - death
The bag was not inverted at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The bag was inverted once	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The bag was inverted 2-3 times	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page 9: Part 2 - incidents involving voriconazole (pumps and lines)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

The infusion giving set was primed before the dose of voriconazole was added to the infusion bag, so the solution in the line did not contain any drug.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

The voriconazole infusion was correctly prepared in a 100 mL infusion bag (total volume 109 mL). However, the infusion pump was programmed to deliver only 50 mL of this infusion.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 10: Part 2 - incidents involving voriconazole (flushing)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

Hospital policy states that a peripheral venous cannula should be flushed with 5 mL of sodium chloride 0.9% before administration of a medicine. However, in the following incidents a different volume was used as a flush:

	0 - no effects	1	2	3	4	5	6	7	8	9	10 - death
1-2 mL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3-4 mL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7 mL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10 mL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Hospital policy states that a peripheral venous cannula should be flushed before administration of a medicine. However, the cannula was **not** flushed before administration of a dose of voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 11: Part 2 - incidents involving voriconazole (rate of administration)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

According to the product license and hospital IV guide, the dose of voriconazole should have been given by IV infusion over 2-3 hours. However, in the following incidents it was given more quickly:

	0 - no effects	1	2	3	4	5	6	7	8	9	10 - death
Injection over 1-2 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infusion over 30 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infusion over 36 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infusion over 45 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infusion over 53 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Infusion over 60 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infusion over 66 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infusion over 75 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infusion over 81 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infusion over 90 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infusion over 98 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

According to the product license and hospital IV guide, the dose of voriconazole should have been given by IV infusion over 2-3 hours. However, in the following incidents it was given more slowly:

	0 - no effects	1	2	3	4	5	6	7	8	9	10 - death
Infusion over 3.5 hours	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infusion over 3.75 hours	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infusion over 3.9 hours	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page 12: Part 2 - incidents involving voriconazole (dilution and rate of administration)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

According to the product license and hospital IV guide, the reconstituted voriconazole should have been diluted to at least 5 mg/mL and given by IV infusion over 2-3 hours. However, in the following incidents it was given **undiluted** (10 mg/mL) and more quickly:

	0 - no effects	1	2	3	4	5	6	7	8	9	10 - death
Given by injection over 5 seconds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Given by injection over 30 seconds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Given by injection over 3-5 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Given via a syringe pump over 60 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Given via a syringe pump over 90 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

According to the product license and hospital IV guide, the reconstituted voriconazole should have been diluted to at least 5 mg/mL and given by IV infusion over 2-3 hours. However, 40 mg was given undiluted (10 mg/mL) by injection over a few seconds, then the rest of the dose (320 mg) was diluted to 3 mg/mL and infused over 1 hour.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 13: Part 2 - incidents involving voriconazole (delay)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

A member of staff was unable to work out how to prepare and administer the dose of voriconazole from the hospital IV guide. This meant the dose was delayed whilst the advice of a colleague was obtained. Please rate this incident based on your experience of a typical delay in this situation.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 14: Part 2 - incidents involving voriconazole (plastic tray)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

Hospital policy states that during the preparation of an IV medicine, equipment (syringes, needles, vials etc) should be placed in a plastic tray. However a tray was **not** used when preparing a dose of voriconazole, so equipment was placed on the worktop.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that during the preparation of an IV medicine, equipment (syringes, needles, vials etc) should be placed in a **plastic** tray. However a **cardboard** tray was used when preparing a dose of voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that the plastic tray should be cleaned/disinfected with a suitable wipe before use, but this did **not** happen before preparing a dose of voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 15: Part 2 - incidents involving voriconazole (ANTT)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

Hospital policy states that a disposable apron should be worn during the preparation of an IV medicine, however an apron was **not** worn when preparing a dose of voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that a disposable apron should be worn during the preparation of an IV medicine, however the apron was only put on after a dose of voriconazole had been reconstituted (i.e. before dilution).

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that whilst preparing an IV medicine, needles attached to syringes should be covered with a sheath before they are put down. However, whilst preparing a dose of voriconazole, an **unsheathed** needle and syringe (containing the drug) were put down in a **plastic tray**.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9

- ☐ 10 - death

Hospital policy states that whilst preparing an IV medicine, needles attached to syringes should be covered with a sheath before they are put down. However, whilst preparing a dose of voriconazole, an **unsheathed** needle and syringe (containing the drug) were put down on the **worktop**.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that whilst preparing an IV medicine, the syringe tip should **not** be touched. However, whilst preparing a dose of voriconazole, the syringe tip was touched with a gloved hand (non-sterile glove).

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6

- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 16: Part 2 - incidents involving voriconazole (hands)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

Hospital policy states that hands should be washed before cleaning the plastic tray in which a dose of an IV medicine is prepared. However, when preparing a dose of voriconazole, hands were **not** washed before cleaning the plastic tray.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that hands should be rewashed after cleaning the plastic tray and assembling the necessary equipment, and before preparing the dose. However, when preparing a dose of voriconazole, hands were **not** rewashed at this point.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hands were **not washed at all** before preparing and administering a dose of IV voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that gloves should be worn whilst preparing and administering an IV medicine. However, gloves were **not** worn whilst preparing and administering a dose of voriconazole, although the hands had been washed.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hands were **not** washed and gloves were **not worn** whilst preparing and administering a dose of IV voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that hands should be washed and gloves changed between preparing the dose of an IV infusion and attaching the giving set to the cannula. However, hands were **not** washed and gloves were **not changed** at this point when preparing a dose of voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that hands should be washed and gloves changed between preparing the dose of an IV infusion and attaching the giving set to the cannula. However, hands were **not** washed at this point when preparing a dose of voriconazole, although the gloves were changed.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8

☐ 9

☐ 10 - death

Page 17: Part 2 - incidents involving voriconazole (cleaning)

For the rest of the survey, all incidents relate to an adult patient (weight = 60 kg) prescribed a 6 mg/kg loading dose (360 mg) of voriconazole for administration by IV infusion over 2-3 hours.

Please rate the **potential clinical significance** of each of the following voriconazole incidents. Assume that the patient is on a general medical or surgical ward with peripheral venous access. As a full clinical history is not available, please use your judgement to rate the potential clinical significance for a typical patient prescribed voriconazole.

You may find the following links useful, but there is no requirement to use them:

- [Summary of Product Characteristics for voriconazole](#)
- [BNF entry for voriconazole](#)

Hospital policy states that before reconstituting an IV medicine, the rubber septum of the vial should be cleaned with an alcohol wipe. However, this did **not** happen when preparing a dose of IV voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that before adding an IV medicine to an infusion bag, the rubber septum of the bag should be cleaned with an alcohol wipe. However, this did **not** happen when preparing a dose of IV voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Hospital policy states that before attaching an IV infusion, the port of the patient's peripheral venous cannula should be cleaned with an alcoholic chlorhexidine wipe. However, this did **not** happen when giving a dose of IV voriconazole.

- ☐ 0 - no effects
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 - death

Page 18: Final page

Thank you very much for your help with this project, it is much appreciated.

Best wishes,

Matthew.
