

**Case 200803057: Tayside NHS Board**

**Summary of Investigation**

***Category***

Health: Diagnosis; clinical treatment

***Overview***

The complainant (Mr C) raised a number of concerns regarding the treatment his late father (Mr A) received during his admission to Ninewells Hospital (the Hospital). Mr C feels that Tayside NHS Board (the Board) failed to assess Mr A's creatine kinase (CK) levels early enough and that the treatment he received for high potassium levels fell short of what could be reasonably expected. Mr C believes that the Board's failure to treat Mr A appropriately resulted in his premature death.

***Specific complaints and conclusions***

The complaints which have been investigated are that:

- (a) there was a delay in testing CK level (*upheld*); and
- (b) the Board failed to treat Mr A's elevated potassium levels appropriately (*upheld*).

***Redress and recommendations***

The Ombudsman recommends that the Board:

- (i) ensures patients with new and significant muscular weakness, as was found in this case, who are taking statins, should have their CK level checked on admission;
- (ii) the Board issue an apology to the family of Mr A and accept that there was a failure to provide urgent medical treatment;
- (iii) the Board evaluate existing policy in relation to the usage of 12 lead electrocardiograms when determining cardiac risks and provide Mr C and the Ombudsman with the evidence and outcome of this review; and
- (iv) the Board apologise to the complainant and review the way this complaint was handled to see if there are any lessons to be learned for the future handling of complaints.

The Board have accepted the recommendations and will act on them accordingly.

## **Main Investigation Report**

### **Introduction**

1. On 11 May 2009, the complainant (Mr C) wrote to the Ombudsman regarding the care and treatment his late father (Mr A) received during his last admission to Ninewells Hospital (the Hospital). Mr C complained that Mr A should have been tested for creatine kinase (CK, the enzyme liberated by damaged muscle) levels on admission as he felt this would have changed Mr A's course of treatment. Mr C believes that in turn this may have saved Mr A's life, leaving him with what he described as an 'entirely manageable' condition. Mr C also complained that there was a delay in providing Mr A with urgent dialysis (also known as haemodialysis; a method of removing waste products from the blood) and that he should have received treatment for his elevated potassium levels in the interim.

2. The complaints from Mr C which have been investigated are that:
- (a) there was a delay in testing CK level; and
  - (b) Tayside NHS Board (the Board) failed to treat Mr A's elevated potassium levels appropriately.

### **Investigation**

3. During the course of my investigation, I have considered the evidence provided by Mr C and the Board. Mr A's medical records were also referred to the Ombudsman's specialist medical adviser (the Adviser) for his views. The Adviser commented that there was evidence, in some instances, of good practice, but was concerned that the Board failed to provide Mr A with basic treatment that ultimately could have saved his life. The Adviser's comments were supplemented by advice from a consultant nephrologist with experience in dialysis. I referred the Adviser's response to both Mr C and the Board for their comments prior to drafting this report.

4. I have not included in this report every detail investigated but I am satisfied that no matter of significance has been overlooked. Mr C and the Board were also given an opportunity to comment on a draft of this report. Please refer to annex 2 for a more detailed glossary of terms.

### *Background*

5. After being referred by his GP, 66-year-old Mr A was admitted to Ward 22 at the Hospital on 27 June 2008 with acute weakness in his upper and lower

limbs and areflexia (the absence of neurological reflexes such as the knee jerk reaction). Mr A had been experiencing symptoms since his discharge from the Hospital 11 days previously, after being treated for a lower respiratory tract infection. He had multiple medical conditions including chronic kidney disease (requiring dialysis three times per week) and ischaemic heart disease.

6. On admission, the consultant physician (Doctor 1) was concerned that Mr A may have had acute onset inflammatory polyneuropathy (damage to nerves outside the brain or spinal cord) in keeping with Guillain-Barré syndrome, a disease that affects the peripheral nervous system and in turn the function and movement of limbs. Treatment was planned with this in mind and Mr A was transferred to the Medical High Dependency Unit (MHDU) later that evening for cardiac and respiratory observation. Mr A was reviewed on 28 June 2008 by the neurology specialist registrar (Doctor 2) and a lumbar puncture (see annex 2) was performed that evening in order to validate the diagnosis. The results confirmed that Mr A did not have elevated levels of protein present within the cerebrospinal fluid (a clear, colourless fluid which fills the ventricles of the brain and the central canal of the spinal cord), which was contrary to what could be expected with inflammatory polyneuropathy. Haemodialysis was also carried out earlier that day.

7. At 09:50 on the morning of 29 June 2008, Mr A's potassium levels were recorded at 6.9 mmol/L (millimoles per litre). 5.5 mmol/L and above is deemed to be hyperkalaemia; 7 mmol/L is considered severe hyperkalaemia which would, in any patient, require urgent medical treatment. Mr A's potassium level rose to 7 mmol/L later that day and he was described in his nursing notes as having become increasingly agitated. Doctor 1 decided that in light of this and the muscle tenderness he had displayed at review, Mr A's CK level was to be tested for the possibility of rhabdomyolysis (release of muscle fibre contents into the bloodstream). Results confirmed rhabdomyolysis and a decision was taken to arrange emergency dialysis. Before dialysis had taken place, or any treatment for the hyperkalaemia had been administered, Mr A's condition deteriorated further and at 12:20 he went into cardiac arrest, suspected to have been induced by hyperkalaemia. He was treated intravenously with calcium chloride, insulin and dextrose but unfortunately did not recover. Mr A died when cardiopulmonary resuscitation was discontinued at 12:46.

**(a) There was a delay in testing CK level**

8. Mr C complained to the Board that Mr A's CK level should have been tested on admission given that he was a renal patient presenting with a ten-day history of lower leg pains and cramps. Mr C informed the Board that he and his wife are both medical doctors and that, in his opinion, Mr A's CK level on 29 June 2008 of 120 000 U/L (units per litre) was 'grossly elevated' and that the test should have been carried out earlier. Mr C believed that had the diagnosis of rhabdomyolysis been made earlier, the course of treatment Mr A received would have been altered and could ultimately have prevented his death.

9. The Board wrote to Mr C on 2 March 2009 and informed him that the reason they did not test Mr A's CK level until 29 June 2009 was because he had not displayed 'signs suggestive of rhabdomyolysis' until that point. They commented that medical staff responsible for Mr A, including his GP, Doctor 2 and junior medical staff, had noted weakness and areflexia as being the 'pertinent' symptoms. The Board stated that there had been no comment about muscle tenderness up until this point and that Doctor 1 only tested for rhabdomyolysis due to the rapid elevation in potassium levels since his last dialysis session the day before.

10. The Board said that Doctor 1's view was that checking Mr A's CK level earlier would not necessarily have altered his course of therapy, other than the discontinuation of his statin treatment (drugs that help lower cholesterol levels in people with or at risk of cardiovascular disease). The Board remains unclear as to exactly why Mr A developed rhabdomyolysis as he had been on statin therapy for some time without any alteration to dosage prior to admission. Mr A was prescribed antibiotics two weeks previously and had also been taking fludrocortisone for his low blood pressure. The Board commented that neither medication was associated with any notable interaction with statins, or as a cause of rhabdomyolysis.

11. The Adviser considered the treatment Mr A received and whether the fact that his CK level was tested three days after admission was acceptable. The Adviser felt that the process of investigation carried out during Mr A's diagnosis was acceptable in relation to the symptoms he presented. He noted that senior staff discussed the matter and that Mr A received prompt specialist review (via a neurology specialist) and that was appropriately managed within a HDU environment.

12. The Adviser felt that the initial diagnosis of inflammatory polyneuropathy, or Guillain-Barré syndrome, was not unreasonable given Mr A's symptoms. He believed that the correct diagnosis of rhabdomyolysis (subsequent to the lumbar puncture) being made within 48 hours of admission was also acceptable. The Adviser agreed, however, that patients being treated with statins who present with symptoms comparable to Mr A's should have CK level tested on admission. However, he did not agree that earlier diagnosis of rhabdomyolysis would have changed Mr A's later tendency to develop hyperkalaemia. His view was that Mr A was probably predisposed to elevated potassium levels by this stage and, irrespective of whether rhabdomyolysis had been diagnosed earlier; he felt that the onset of hyperkalaemia was imminent.

*(a) Conclusion*

13. The Adviser felt that there would have been no change in the treatment of Mr A, or his tendency to develop hyperkalaemia, had the CK level been checked on admission. However, he did agree that it still should have been checked. Mr A was diagnosed correctly within 48 hours, which again has been deemed acceptable by the Adviser. However, a routine check, considering Mr A's medical history - not necessarily the symptoms he presented with - would have unveiled the correct diagnosis much earlier.

14. In light of the evidence available, and the advice I have received, I have concluded that, as a renal patient being prescribed statins, Mr A's CK level should have been tested on or immediately after admission and that there was an unnecessary delay in carrying out this test. I, therefore, uphold this part of the complaint.

*(a) Recommendation*

15. The Ombudsman recommends that patients with new and significant muscular weakness, as was found in this case, who are taking statins, should have their CK level checked on admission.

**(b) The Board failed to treat Mr A's elevated potassium levels appropriately**

16. In his complaint to the Board, Mr C noted from Mr A's medical records that he was reviewed on the morning of 29 June 2008. Blood tests carried out earlier that day revealed a potassium level of 6.9 mmol/L. Mr C commented that the decision to carry out dialysis was recorded within Mr A's notes and that he would also have his CK level tested. He highlighted an entry within the

nursing records at 09:00 which noted that Mr A's CK level had been telephoned through by the duty biochemist that morning. Mr C observed that the following note did not refer to any subsequent emergency treatment and that the records have Mr A suffering a cardiac arrest at 12:20.

17. Mr C felt that the Board failed to provide acute treatment for Mr A's elevated potassium levels (hyperkalaemia). He questioned how this situation ever arose given the 'severely elevated' levels recorded within Mr A's notes. In his letter to the Board of 8 December 2008, Mr C questioned why emergency measures had not been taken. He continued:

'Emergency measures as identified in any standard medical textbook/guideline i.e. calcium gluconate [mineral supplement], insulin/dextrose infusion and salbutamol [drugs which can lower potassium levels] were not commenced when the potassium level were raised to such a high extent. There is also no evidence of an ECG [electrocardiogram] being performed to check to see if there were any cardiac changes due to the elevated potassium.'

18. Mr C felt that, in light of Mr A's condition, this was the most basic level of care he could have expected and that, had Mr A undergone emergency treatment for the hyperkalaemia when it was first identified, he would not have suffered the terminal cardiac arrest.

19. In their letter to Mr C of 2 March 2009, the Board stated that Mr A had been reviewed on the morning of 29 June 2008 by Doctor 1. Doctor 1 had noted Mr A's elevated potassium levels (6.9 mmol/L) and that he had become agitated, complaining of burning sensations throughout his body. The Board stated that Doctor 1 decided at this point to arrange for the CK test and haemodialysis. After the review, the Board said that before finishing his rounds, Doctor 1 approached the on-call dialysis nursing staff at the Renal Unit in order to arrange an emergency session for Mr A. The Board advised that it was Doctor 1's intention that Mr A was to undergo 'urgent dialysis' due to the hyperkalaemia.

20. The Board informed Mr C that the provision of dialysis on Sundays is arranged via an acute team consisting of two registered nurses and a health care assistant. Their role is to carry out dialysis therapies within the Renal Unit as well as outlying wards such as medical and surgical HDUs, Intensive Care Unit and Coronary Care Unit. The Board further explained the unpredictable

nature of such a workload and the capacity to which they can work to. This could be between four to eight treatments per shift and could be spread between the aforementioned locations. The Board said that the consultant and the nurse in charge of the unit would normally meet to discuss and agree the daily workload. If this was deemed excessive then additional staff would be drafted in. The Board advised that there were no concerns over the staffing levels on 29 June 2008.

21. The Board carried out a 'root cause analysis' to establish the chain of events leading up to Mr A's death. The Board found that there was a breakdown in communication between medical and nursing staff within the Renal Unit. They said that the request for emergency dialysis was passed to a junior member of nursing staff by the renal registrar (Doctor 3). The Board said that the nursing staff misinterpreted the request for urgent dialysis, considering Mr A to be an urgent priority in relation to outlying patients and not those already scheduled for treatment. The Board stated that:

'Normally if a patient requires urgent dialysis every effort is made by the team to initiate dialysis as quickly as possible or within an agreed timeframe.'

22. The Board continued that the fact that Mr A had elevated potassium levels had been recorded on the dialysis prescription, but that this had not prompted the nursing staff to reprioritise the order in which the patients were to be treated.

23. Doctor 1 was then said to have telephoned the Dialysis Unit around 12:00 to request immediate treatment as Mr A had gone into cardiac arrest. The Board explained that three other patients were undergoing dialysis and that there was no staff immediately available to carry out the procedure. After drafting in additional support to deal with the request, the Renal Unit was informed that Mr A had died.

24. The original intention of Doctor 1 was to have Mr A dialysed within an hour, which would have resolved the hyperkalaemia. This was also the Board's reasoning as to why he did not receive any acute medical treatment. The Board agreed that a 12 lead ECG had not been carried out, but that he had received cardiac monitoring within the MHDU since his admission. The Board said that Mr A had shown no significant bradycardia (a resting heart rate of under 60 beats per minute) and that he had a normal rhythm during the period up until the cardiac arrest. They continued that a right bundle branch (a defect in the



heart's electrical conduction system) block was noted as his baseline rhythm (average heart rate) but that there was no signs of hyperkalaemia, which can be identified through an ECG.

25. The Board acknowledged that due to the breakdown in communication between the consultant and the nurse in charge, Mr A was not dialysed within an acceptable period of time and they apologised unreservedly for this. Staff at the Hospital, through the Board's response, assured Mr C that they had learned from the experience and that improvements designed to prevent this from reoccurring had been introduced. The Board listed the following proposed changes:

- hyperkalaemia to be treated in future until haemodialysis can be commenced;
- a safety briefing to take place at 10:00 on Sundays between the consultant and the nurse in charge of the Dialysis Unit and Renal Ward. This will serve to confirm/prioritise workload, review staffing levels and ensure appropriately skilled personnel are available to deal with emergencies; and
- an acute shift to be established on a Sunday within the Acute Renal Ward.

26. In his complaint to the Ombudsman, Mr C remained dissatisfied, believing that the Board had blamed any shortcomings in service on communication, nursing staff, procedures and systems. He did not feel that the Board had properly addressed the delay in providing dialysis or medical treatment to his father. Mr C reiterated these points in his letter to the Board on 18 June 2009. He was unhappy that he had not received a formal apology from 'the parties who were directly involved' in the 'mistakes' that he believes led to his father's death.

27. The Adviser reviewed this part of the complaint and considered the allegations made by Mr C. In the Adviser's opinion, the Board did not deliver specific and timely treatment to Mr A. He believed that this constituted a failure to provide the standard of treatment that Mr A should reasonably have expected. The Adviser noted that after being seen by Doctor 1, dialysis was requested 'urgently' (within one hour). He continued that, despite the delay in provision of dialysis, no temporary measures, such as drug treatment to lower the potassium level or protect the heart from the adverse effects of high potassium, were instituted. The Adviser felt that had emergency dialysis been unavailable or Mr A was not being cared for within a specialist unit, he would

have received that standard medical treatment for hyperkalaemia. The Adviser believed that this may have saved Mr A's life.

28. The Adviser had concerns as to the urgency and efficiency of the actual request process. He questioned why, if Doctor 1 believed the level of hyperkalaemia was such that urgent dialysis was needed, did he not then clearly establish exactly when dialysis would occur.

29. The Adviser said that if a delay of, in his opinion, more than 30 minutes was expected, then temporary medical treatment should have been given. He added that this treatment is simple, routine and unlikely to be detrimental to the patient.

30. Over two hours elapsed between the decision to commence urgent dialysis and the patient's cardiac arrest and that, in the Adviser's opinion, failure to either start dialysis, or give temporary medical treatment for the hyperkalaemia in the interim, over that period of time, was unreasonable.

31. The Adviser challenged the Board's suggestion that cardiac arrest or arrhythmia (irregular heartbeat) could be confidently determined from an ECG monitor rather than from a full 12 lead ECG trace. He said that it is standard practice to obtain a full 12 lead ECG to assess cardiac risk from high potassium levels as the cardiac effects of hyperkalaemia cannot be accurately assessed from a bedside monitor. This was, he continued, even more pertinent if the patient had a pre-existing abnormality (Mr A had 'right bundle branch block'). The Adviser concluded that in his opinion, the Board's failure to undertake a 12 lead ECG was unreasonable.

32. From Mr A's medical records, the Adviser identified the Board's acknowledgement that, had the breakdown in communication not occurred, the cardiac arrest could have been avoided. The Adviser agreed and suggested that Mr A might have survived had the breakdown in communication not occurred. In addition to this, he felt that Mr A's chances of survival also would have increased had the Board not failed to medically treat Mr A's hyperkalaemia. He believed that the non-availability of immediate dialysis, relating either to poor prioritisation of those needing dialysis (communication), limitation in staffing, or limitation in dialysis space or equipment, were all contributing factors in Mr A's deterioration.

33. The Board's proposed changes were considered by the Adviser to be appropriate and reasonable to an extent, however, not far reaching enough to ensure there are no recurrence of the problems associated with this case in the future. The Adviser commented that this type of incident could occur at any time and that other measures may be required to ensure that 'urgent' dialysis, means urgent at all times. The Adviser said that he was unsure of the Board's facilities in relation to dialysis space and the availability of equipment at the time of referral (10:00). He noted that, when the patient arrested (12:15), there were three patients undergoing treatment and that the Dialysis Unit could not undertake more without drafting in additional staff.

34. The Adviser stated that the Board should review their provision of urgent dialysis space and equipment, rather than the staffing to provide dialysis alone. He suggested that having additional staff and equipment would not necessarily prevent incidents happening again and that the real issue was not relative to any limitation on staff or equipment, but on how the need for urgent dialysis was communicated by doctors, or indeed received by nurses. The Adviser felt that the process could be improved by making consultants and senior dialysis nurses jointly responsible for arranging urgent dialysis. The Adviser felt that the risk and probability of incidents would remain high should the task of arranging urgent dialysis continue to be delegated to a registrar or junior member of nursing staff.

35. The Board and Mr C were given the opportunity to comment further upon the advice provided to the Ombudsman. In their letter of 14 August 2009, the Board repeated their finding that the delay in providing Mr A with dialysis was the direct result of nursing staff interpreting Doctor 1's instructions to mean that Mr A was the first outlying patient to be dialysed, not that dialysis was required immediately. They stated that, 'had the request for urgent dialysis been clearly conveyed and understood to mean that immediate dialysis was required, the nurse in charge that day would have deployed staff accordingly to MHDU'.

36. The Board confirmed that formal meetings are held Monday to Friday to discuss, plan and prioritise the dialysis workload for acute cases. This did not apply to Saturday and Sunday cases where the Board referred to an 'understanding' which was in place between the Dialysis Unit and outlying departments whereby dialysis instructions were to be 'delivered promptly' to allow the team to plan the workload. The Board recognised that there were failings relating to this system and have since formalised requests with

meetings between the on-call consultant and the dialysis nurse in charge. This nurse will act as shift co-ordinator, responsible for the allocation of workload and staff roster.

37. The Board confirmed that additional new ways of working have been introduced such as replacing the on-call system with a team dedicated to providing out-of-hours dialysis overnight. They have increased their staffing levels and introduced training to help implement this change. In situations where dialysis is required immediately, the Board have confirmed that requests are to be channelled from the consultant or registrar directly to the nurse in charge in order to reprioritise the workload and deploy staff accordingly. In relation to equipment and space, the Board highlighted that there had never been concerns with the facilities, especially on a Sunday, as there are 30 plus dialysis machines available for use.

38. The actual process for requesting urgent dialysis has been changed in relation to the prescription itself. This now will be used by the Board in situations where hyperkalaemia or pulmonary oedema (fluid accumulation in the lungs) have been identified as requiring dialysis within the hour. The prescription itself will be required to be completed by medical staff who will also be personally responsible for ensuring that dialysis is delivered within the appropriate timeframes. If this is not possible, the Board have placed responsibility upon medical staff for taking appropriate action, which could mean taking less acute patients off dialysis to allow for more pressing cases to be dealt with. The Board have said that they intend to monitor the efficiency of the service and its impact on the dialysis service for acute patients.

39. On considering the response from the Board, the Adviser welcomed what he believed to be evidence of real and meaningful changes. He said that they had demonstrated a positive change in approach which would go some way to preventing this type of incident happening again. He recognised that the Board had addressed the staffing and communication issues, clarified the future management of hyperkalaemia, acidosis and pulmonary oedema. He was satisfied that they had also explained the fact that equipment availability was not an issue. However, he remained of the opinion that the Board could still be criticised for the non-treatment of the hyperkalaemia while Mr A awaited dialysis and for the communication breakdown which led to that delay.

40. In an email to the Ombudsman dated 1 September 2009, Mr C commented that the Board's investigation and subsequent response focused on the communication issues between nursing and medical staff. Mr C appreciated the Board had effected changes in order to prevent this type of incident occurring in the future. However, he felt that in their response, the Board failed to address what he viewed as 'clinical mismanagement' on the part of the medical team, which he felt contributed to the death of his father. He referred to the 12 lead ECG in particular and the non-treatment of Mr A's elevated potassium level. He stressed his opinion that a gross error was made by the Board in failing to communicate the need for urgent dialysis, and that greater errors were made due to what he considered as medical negligence on the part of those responsible for his father's care.

*(b) Conclusion*

41. Hyperkalaemia was evident by 09:50. Mr A had not received any treatment for this before his cardiac arrest at around 12:15. This was unacceptable. If there was any delay of more than 30 minutes in providing dialysis, then medical treatment for the hyperkalaemia should have been given. The Board's investigation found that a breakdown in communication was the root cause of the problem. However, while I accept that there were communication problems, I do not accept that communication alone was the issue. The consultant responsible for Mr A should have ensured that Mr A was provided with either immediate dialysis or medical treatment in the interim. No treatment was given. In not providing urgent treatment to Mr A, the Board significantly reduced his chances of survival. I uphold the complaint.

*(b) Recommendations*

42. The Ombudsman recommends that the Board:

- (i) issue an apology to the family of Mr A and accept that there was a failure to provide urgent medical treatment; and
- (ii) evaluate existing policy in relation to the usage of 12 lead ECGs when determining cardiac risks and provide Mr C and the Ombudsman with the evidence and outcome of this review.

*Supplementary Issue*

43. I have welcomed some of the changes the Board have made in response to this complaint. However, I am very concerned that in considering Mr C's complaint they have not addressed his specific question of why no urgent treatment at all was given to his father in the absence of dialysis when such,

possibly life saving, treatment was available. In my view this is a significant failure in complaint handling and in trying to learn lessons from complaint handling.

44. I recommend that the Board apologise for this failure. I also recommend that the Board review the way this complaint was handled to see if there are any lessons to be learned for the future handling of complaints.

45. The Board have accepted the recommendations and will act on them accordingly. The Ombudsman asks that the Board notify him when the recommendations have been implemented.

**Explanation of abbreviations used**

Mr C	The complainant
Mr A	Mr C's father
The Hospital	Ninewells Hospital
CK	Creatine kinase
The Board	Tayside NHS Board
The Adviser	Specialist medical adviser
Doctor 1	Consultant physician
MHDU	Medical High Dependency Unit
Doctor 2	Neurology specialist registrar
HDU	High Dependency Unit
ECG	Electrocardiogram
Doctor 3	Renal registrar responsible for passing on dialysis instruction
Mmol	Millimoles per litre

**Glossary of terms**

Acidosis	Increased acidity of the blood
Areflexia	The absence of neurological reflexes such as the knee jerk reaction
Bradycardia	A resting heart rate of under 60 beats per minute
Cardiac arrest	When the heart stops beating and circulating blood to the bodies organs
Cardiopulmonary resuscitation	An emergency procedure consisting of external cardiac massage and artificial respiration to restore circulation of the blood and prevent death or brain damage due to lack of oxygen
Cerebrospinal fluid	A clear, colourless fluid which fills the ventricles of the brain and the central canal of the spinal cord
Creatine kinase	The enzyme liberated by damaged muscle
Electrocardiogram (ECG)	A test which records the rhythm and electrical activity of the heart
Guillain-Barré syndrome	A disease that affects the peripheral nervous system and in turn the function and movement of limbs
Haemodialysis	A method of removing waste products from the blood
Hyperkalaemia	Elevated potassium levels



Inflammatory polyneuropathy	Nerve swelling and irritation (inflammation) that leads to a loss of movement or sensation
Intravenous	Within or into a vein
Ischaemic heart disease	A disease characterised by reduced blood supply to the heart muscle
Lumbar puncture	The insertion of a hollow needle beneath the arachnoid membrane of the spinal cord in the lumbar region to withdraw cerebrospinal fluid for diagnostic purposes or to administer medication
Neurology	The branch of science which treats of the nervous system
Pulmonary oedema	Fluid accumulation in the lungs
Rhabdomyolysis	The breakdown of muscle fibers resulting in the release of muscle fiber contents (myoglobin) into the bloodstream