Scottish Parliament Region: North East Scotland

Case 200502264: Tayside NHS Board

Summary of Investigation

Category

Health: Hospital; Renal Management; Coronary Care; Complaint Handling

Overview

Mrs C raised a number of serious concerns about the failure of staff at Ninewells Hospital (the to diagnose and treat her husband when he was admitted with heart failure. Mr C died within 24 hours of being admitted to the Hospital. Mrs C also raised a concern about a change in Mr C's medication shortly before his death. A final complaint concerned the time taken by the Board to respond to Mrs C's complaint and the failure to fully address her concerns.

Specific complaints and conclusions

The complaints which have been investigated are:

(a) failure to diagnose and provide treatment for Mr C's heart failure (*upheld*);
(b) inappropriate change in medication (*not upheld*); and
(c) failure in complaint handling (*upheld*).

Redress and recommendations

The Ombudsman recommends that the Board:

(i) undertake a review of the operation and knowledge of the two Chest Pain Protocols at the Hospital and consider the adoption of a single unified protocol;
(ii) review the events in this complaint at an MAU multi-disciplinary meeting to ensure lessons are learned from the failure to recognise the seriousness of Mr C's condition and to react promptly and appropriately to his deterioration;
(iii) apologise in writing to Mrs C for their failure to provide an adequate or timely response to her complaint; and
(iv) ensure that their complaints handling process both acknowledges any errors identified and uses these to drive service improvement.

The Board have accepted the recommendations and will act on them

accordingly.

Main Investigation Report

Introduction

1. On 17 November 2005 the Ombudsman received a complaint from the complainant (Mrs C) concerning the care and treatment her husband (Mr C) had received from Ninewells Hospital, Dundee (the Hospital) between 13 July 2005 and 16 July 2005. Mrs C considered this to have been inadequate and ultimately to have allowed her husband to die a preventable death. Mrs C raised concerns about the time taken to contact her when her husband's condition declined which prevented her arriving at the Hospital until after his death. Mrs C also complained about NHS Tayside Health Board (the Board)'s handling of her complaint.

2. The complaints from Mrs C which I have investigated are that there was:

(a) a failure to diagnose and provide treatment for Mr C's heart failure;

(b) an inappropriate change in medication; and

(c) a failure in complaint handling.

Investigation

3. Investigation of this complaint involved meeting with the complainant and members of her family who supported her in making this complaint, reviewing Mr C's clinical records for the relevant period, reviewing the Board's complaint file and making a number of detailed written and telephone enquiries of the Board. I have also sought preliminary and further advice from one of the Ombudsman's medical advisers (the Adviser) who is qualified to comment on the events of this complaint. I have had additional advice on the comments of the Board from an A&E adviser (A&E Adviser) to the Ombudsman but this is not directly referred to in this report. The Adviser and I met with Board staff following the issue of the draft of this report to discuss the failures identified in this report and the views of the A&E Adviser. Consideration was also given at this meeting to what improvements could be made to processes to avoid some of these failures.

4. I have not included in this report every detail investigated but I am satisfied that no matter of significance has been overlooked. Mrs C and the Board were given an opportunity to comment on a draft of this report.

Medical Background

5. Mr C had a medical history of chronic kidney disease and ulcerative colitis. He also had a history of cardiac arrest and a probable myocardial infarction in 1996. Mr C attended the renal out-patient clinic for regular review.

6. On 13 July 2005, Mr C was seen by Consultant 1 at the renal clinic at the Hospital and was found to have raised blood pressure. The dosage of lisinopril, one of Mr C's anti-blood pressure drugs, was increased from 10mg daily to 20mg daily to try to address this.

7. On 15 July 2005, Mr C complained of chest pain which was not relieved by glyceral tri-nitrate (GTN), a spray used to dilate the heart blood vessels and relieve the pain of angina. Mr C was admitted to the Hospital Accident and Emergency Department (A&E) at 15:00 by ambulance with chest pain and low blood pressure.

8. The admitting A&E doctor, Doctor 1, noted in the medical record a diagnosis of Acute Coronary Syndrome (an umbrella term used to cover any group of clinical symptoms compatible with chest pain due to insufficient blood supply to the heart muscle that results from coronary artery disease). Doctor 1 commented on Mr C's known history of heart disease and cardiac arrest. Doctor 1 recorded a low blood pressure reading (95/70) and noted evidence of fluid retention on the lungs which was confirmed by x-ray. Following sight of the x-ray Doctor 1 also diagnosed left ventricular failure. A cardiogram (ECG) was carried out at 15:06 which was abnormal. Doctor 1 decided to admit Mr C to the Medical Admission Unit (MAU) for further observation at 15:55.

9. Mr C was seen by Registrar 1 in MAU at 19:55 who noted that Mr C was pain free and his chest clear. Registrar 1 did not make any record of Mr C's blood pressure although the nursing notes for 16:15 and 18:25 both show low blood pressure readings (96/74 and 90/71). Mr C's blood oxygen saturation was shown to be 92% on 5 litres of oxygen per minute (normal should be 95% on air). Registrar 1's diagnosis was unstable angina and blood tests and other investigations were arranged. Registrar 1 noted abnormalities in a second ECG performed at 19:00 and reviewed the chest x-ray noting 'some failure, especially on the right'. Mr C's treatment was adjusted to include aspirin and low molecular weight heparin (both given for anti-clotting effects). At 22:00 Mr C's blood pressure was noted to have fallen to 87/63 and a decision was taken to lower the dose of lisinopril to 10mgs from the next day and monitor the blood

pressure overnight. The low blood pressure was ascribed to 'medication induced hypotension' i.e. due to the anti-blood pressure tablets.

10. At 00:30 on 16 July 2006 and again at 01:15 ward staff noted low blood pressure and called for a Senior House Officer (SHO) to attend. There is no record of anyone attending and the only action which appears to have occurred is the raising of the foot of Mr C's bed.

11. The TPR (temperature, pulse and respiration) sheet for MAU indicates that Mr C should have been on hourly observations but in fact results were recorded at 16:15, 18:25 and 22:00 before being taken hourly. I also note that the total score recorded at 16:15 is incorrectly stated although the incorrect (lower) result was still sufficient to require hourly monitoring according to the TPR sheet.

12. A troponin T test (a chemical released by heart muscle when it is damaged) was taken at 01:30. The time of the result is not noted in the clinical records (the Board have advised me that it was available at 02:30) but it showed a significantly raised level and was conclusive evidence of a heart attack.

13. At 04:00, Mr C was reviewed by SHO 1 from the Coronary Care Unit (CCU) and a diagnosis of cardiogenic shock was made with a transfer to CCU recommended. Several actions were taken at this time including the insertion of a central venous line which was performed in MAU by SHO 2 as SHO 1 had been called to a medical emergency in A&E.

14. Mrs C was contacted at 06:00 by CCU staff to inform her of Mr C's transfer to CCU. Mr C was transferred to CCU as planned but on arrival was semi-conscious, cold and clammy and neither blood pressure nor oxygen saturation readings could be obtained. Mr C became unconscious and cardiac arrest occurred very soon after. Resuscitation was attempted but was unsuccessful and Mr C was pronounced dead at 06:10.

15. Mrs C arrived at the Hospital at 06:30 and was informed by a nurse in CCU that Mr C had died. SHO 1 spoke with Mrs C and advised her that the diagnosis of myocardial infarction was uncertain until the result of the troponin blood test became known.

(a) Failure to diagnose and provide treatment for Mr C's heart failure

16. Mrs C complained that despite the fact Mr C showed signs of heart failure on admission at 15:00 on 15 July 2006 he was not admitted to CCU but to MAU. Mrs C raised a concern about this at the time but was advised that Mr C would be appropriately monitored in MAU, but that as it was a Friday evening he could not be reviewed by a coronary specialist until Monday. Mrs C complained to the Board that Mr C should have been given thrombolytic drugs on admission to A&E.

17. Mrs C was also dissatisfied that staff did not attempt to contact her when her husband's condition deteriorated during the night, despite the fact she lived at some distance from the Hospital which meant that she was not able to reach the Hospital until after Mr C had died. Mrs C further complained that staff broke the news of her husband's death in an inappropriate, abrupt way.

18. In their second letter of response to Mrs C, dated 30 March 2006, the Board stated that while there was a suspicion of heart attack following the results of the first ECG there was not sufficient grounds for making a decision to give thrombolytic (clot-busting) drugs. The response also noted that a second ECG at 19:00 showed more clearly the diagnosis of a heart attack and that 'at this time Mr C could have been prescribed the clot dispersing drugs and transferred to the CCU'. The Board then apologised that this did not occur.

19. The Adviser commented that the cardiogram findings on admission were not absolutely typical of an acute heart attack. He noted, however, that there were changes on the cardiogram referred to as left bundle branch block or LBBB (a condition where the fibres conducting the impulse to create a heart beat are damaged). The Adviser told me that it is well known among doctors that a finding of LBBB on a cardiogram can mask changes made when a heart attack has occurred but in his view this point was missed by the medical staff in A&E. The Adviser noted that this effect, in combination with Mr C's known history of cardiac problems and significantly lower than usual blood pressure, should have led to a higher level of suspicion of myocardial infarction from the outset than was the case here. The Adviser also noted that while Mr C had a history of angina, the pain on the day of admission was noted not to respond to GTN, a feature which often distinguishes myocardial infarction i.e. a heart attack, from angina. Given all these factors the Adviser expressed concern that a more rapid transfer to CCU was not arranged. The Adviser also reviewed the Acute Chest Pain Protocol (used by MAU) supplied to me by the Board during

this investigation and noted that in relation to ECG it lists three abnormalities which should lead to a consideration of Thrombolysis - one of which is LBBB. This was apparently not followed by medical staff either in A&E or following a second ECG in MAU.

20. The Adviser noted that despite the evidence of an acute cardiac problem on admission Mr C did not appear to have been medically assessed in MAU for 4 hours during which time his blood pressure continued to fall and his blood oxygenation was below normal. The Adviser commented that he did not consider there had been sufficient monitoring of Mr C's blood pressure in MAU, that he could not support the conclusion of Registrar 1 that the low blood pressure was due to drugs or that it was 'chronically low' as stated by Registrar 1. It was in fact acutely low. The Adviser stated that even if the low blood pressure had been caused by the drug the decision to reduce the dosage of lisinopril from the next morning was inappropriate. The Adviser is of the view that the correct decision in the face of such blood pressure readings would have been to discontinue lisinopril and Mr C's other blood pressure drug, atenolol, altogether. The Adviser is also of the view that this action should have been taken on admission along with a troponin T test which, although not conclusive of a heart attack, would have heightened the suspicion of that diagnosis. In the event the test was not taken until more than 10 hours after admission and not reported until 12 hours after admission. To be effective thrombolysis should occur within 12 hours of the cardiac event and such a time delay in performing the test effectively precluded such action being taken. The Adviser noted that had the evidence been gathered to create a higher suspicion at an earlier stage then treatment with thrombolytic drug and management on CCU would have been considered to be the appropriate course of action rather than admission to MAU.

21. The Adviser commented that even once the decision to transfer to CCU was taken by SHO 1 at 04:00 there was still a delay in transferring Mr C from MAU at 06:00. From the records it appears that there was a problem of immediate bed availability and a delay while SHO 2 had a central venous line inserted. The Adviser has told me that such a bed shortage and some delay is not unusual and one which will be routinely encountered and dealt with by CCU staff.

22. The Adviser told me that he does not agree with a number of statements made by the Board in its response to Mrs C. In particular he drew attention to

the Board's statement that it was thought appropriate to refer Mr C to MAU. As part of the Board's review of the complaint they sought the opinion of their own Consultant Cardiologist, Consultant 2, who had not been directly involved in Mr C's care. Consultant 2 expressed his view that the evidence on admission of recent heart attack was 'very subtle' but that the initial and subsequent ECGs confirmed the diagnosis of heart attack. The Adviser considers that in light of Consultant 2's view the Board should have recognised that the diagnosis was missed and that earlier admission to CCU would have been appropriate. The Adviser also disputed the Board's stated view that Mr C's blood pressure was around normal limits on his attendance at A&E on the grounds that it is both unnecessarily vague and untrue as Mr C's blood pressure was significantly lower than his usual blood pressure. The Adviser finally noted that the Board's comment that drugs were given to Mr C to relieve his heart failure failed to mention that this measure was taken in the few minutes before Mr C's cardiac arrest and was almost certainly too late to be of benefit.

23. Overall the Adviser concluded that 'there was a failure to diagnose Mr C's heart problem in a situation where the history, clinical findings and investigations raised sufficient suspicion to make this a likely diagnosis. As a result there was a failure to transfer Mr C to an appropriate area such as CCU. On the MAU the nursing and medical observations were inadequate and there was a failure to respond to a serious and worsening situation'.

24. In response to my written enquiries the Board commented that the decision by the A&E staff to transfer a patient to MAU or CCU is taken on an individual patient basis and it was not thought that Mr C's condition warranted admission to CCU so he was transferred to MAU for further cardiac assessment. The Board also commented that the initial medical assessment in MAU was inadequate. They advised me that there were no noteable staff shortages that day nor was there a remarkable bed shortage in CCU, although they have no record of the precise availability at the time of Mr C's admission. However, the Board stated that had a bed been required Mr C would have been admitted to CCU. The Board commented that there had been a discussion between the staff of MAU and CCU about where and when it was best to insert the central line but that during this time Mr C had been receiving constant care.

25. In response to the draft of this report the Board stated that NHS Tayside had failed Mr C in the standard of care delivered to him but expressed the view that the failings had occurred solely within the MAU and not A&E. At my

meeting with staff to discuss the draft report it was noted that the TPR sheet for A&E and the ECG performed by the ambulance staff were not available in Mr C's records. The Board were of the view that the TPR document would have been completed but regrettably this could not be used to assist their view that Mr C's condition in A&E did not indicate a need for thrombolysis; similarly the interpretation of the ECG could not be reviewed as the ECG was not available. A subsequent check by staff after this meeting has not uncovered these documents and consequently I cannot rely on any view as to the information which they might have contained. The Board did not agree with the adviser's view that Mr C's LBBB had been missed by staff and indicated a need for thrombolysis as the ECG finding could have been attributable to the previous known LBBB and as Mr C's pain had settled there was in sufficient evidence of a need for thrombolysis at that stage.

26. At my meeting with Board staff there was considerable discussion of the protocol for management of chest pain used by the MAU and A&E. It emerged that A&E followed the protocol of SIGN guideline 93 which differed in some small but potentially crucial aspects from the protocol used by MAU. The adviser expressed concern that two departments were operating different protocols. The Board advised that a number of changes had occurred and were ongoing within the MAU including improved physical layout with greater visibility of patients by nursing staff (a difficulty about which Mrs C had raised concerns).

27. Subsequent to my meeting, the Board have provided me with an update of all the changes referred to in the previous paragraph. The Board also noted that A&E and CCU clinicians had now agreed that the CCU team will review any patient with an abnormal ECG in A&E prior to a decision about where to admit. The Adviser noted that this step could have been of considerable assistance in clarifying the clinical picture in Mr C's case.

(a) Conclusion

28. I make particular note in this case of the very clear view of the Adviser of several clinical failures which occurred in the care and treatment of Mr C on 15 and 16 July 2005. I note too that this concurs in large part with the view of Consultant 2 who reviewed the circumstances of the complaint for the Board. Much of the later discussion of this case has been about where within NHS Tayside the failures occurred rather than whether they occurred. While such a discussion might appear irrelevant to the overall conclusion that NHS Tayside failed in the care provided to Mr C, it is relevant to the actions which need to be

taken to minimise the repeat of such failings. On the medical evidence I have seen I conclude that there was a repeated failure to diagnose heart attack and consequently a failure to provide timely and potentially life-saving treatment.

29. With respect to the delay in advising Mrs C of the change in Mr C's condition, the Adviser has told me that he considers that within the MAU there was a failure to respond to a serious and worsening situation. While I welcome and acknowledge the apologies given by the Board to Mrs C for the delays in informing her of her husband's deterioration and for the manner in which the news of his death was broken to her, I conclude that this failure further supports the Adviser's view that there was a lack of comprehension amongst staff of the serious and deteriorating nature of Mr C's condition. This meant staff failed to contact Mrs C in a timely manner and that more appropriate members of staff were not the first to meet Mrs C on her arrival and to give her the sad news. I, therefore, uphold this aspect of the complaint.

(a) Recommendation

30. In light of the very serious nature of this conclusion the Ombudsman recommends that the Board:

(i) undertake a review of the operation and knowledge of the two Chest Pain Protocols at the Hospital and consider the adoption of a single unified protocol;

(ii) review the events in this complaint at an MAU multi-disciplinary meeting to ensure lessons are learned from the failure to recognise the seriousness of Mr C's condition and to react promptly and appropriately to his deterioration.

The Ombudsman notes the actions already taken and planned by the Board which address a significant number of the issues identified in this report and which would otherwise have necessitated further recommendations.

(b) Inappropriate change in medication (in the renal clinic)

31. Mrs C complained that when Mr C attended the renal clinic on 13 July 2005 it was a very hot day and the conditions in the Hospital waiting room were far from ideal. She also told me that Mr C had had a lengthy wait to be seen and that she believed the recorded increase in Mr C's blood pressure might have been the result of the temperature and the long wait. Mr C's own blood-pressure readings at home had not shown any increase. Mrs C was

concerned that the change in medication might have caused or contributed to Mr C's condition on 15 July 2005.

32. During the local resolution stage of the complaint the Board apologised to Mrs C for the discomfort Mr C had experienced, but stated that Consultant 1 had acted correctly in advising Mr C (and his GP) to double the dosage of lisinopril every day for a week and then have the blood pressure reviewed by his GP. Unfortunately this issue became more complicated because of a misunderstanding between the Board and Mrs C about Mrs C's understanding of the change in dosage. The Board interpreted Mrs C's concerns as being an increase in dosage every day for a week (i.e. 20mg on day 1, 40mg on day 2 etc) and spent some time addressing this concern. In fact Mrs C was aware that it was an increase to 20mg a day for a week and felt that the Board were concentrating on trivialities rather than her substantive point – a view which was not helped by the lengthy delays in obtaining the Board's response (see complaint (c)).

33. The Adviser commented that it is quite understandable that Mrs C should be concerned that Mr C's heart failure occurred so soon after his change in medication. The Adviser told me that he believes the advice given by Consultant 1 was correct and that the change in dose of lisinopril did not contribute to Mr C's heart attack or low blood pressure on the day he was admitted. The Adviser also told me that the hot waiting room might have resulted in a lowered blood pressure rather than a higher one. In any event the Adviser's view is that, while there may have been a number of causes for the increase in blood pressure recorded at the clinic, it is very important to maintain extremely good blood pressure control in patients with renal impairment and the current advice is to aim for a slightly lower than normal blood pressure. The Adviser informed me that a heart attack alone would be sufficient to account for the low blood pressure experienced by Mr C on 15 July 2005 and that lisinopril would not have contributed to Mr C's heart attack.

(b) Conclusion

34. Based on the view of the Adviser I conclude that the actions of Consultant 1 at the renal clinic on 13 July 2005 were medically appropriate and that the change in drug dosage did not contribute to Mr C's subsequent heart failure. I, therefore, do not uphold this aspect of the complaint.

(c) Failure in complaint handling

35. Mrs C first complained to the Board on 11 August 2005 and received a response on 18 January 2006, having contacted the Ombudsman's office on 17 November 2005 as she was frustrated by the lack of response from the Board. We advised Mrs C to wait for the response which we were advised by the Board would be sent out shortly. Mrs C was not satisfied with the response she did receive and contacted both the Board and this office again. We actively took up the complaint on 10 February 2006, and Mrs C received a further response letter from the Board on 30 March 2006. Written enquiries from the Ombudsman's office were sent to the Board on 29 May 2006 and a response was requested by 26 June 2006. In the event a response was not received until 23 August 2006.

36. The Adviser has commented that the first response from the Board was sent five months after the original complaint and that the delay was stated to be due to the complex nature of the case. The Adviser noted that the events concerned one clinic appointment and an admission of less than 24 hours – not something he would consider to be a complex case. He considers the response to be unduly slow. I have mentioned in complaint (a) the Adviser's concern that the Board failed to give due weight to the views of Consultant 2 in making their response to Mrs C.

37. I have reviewed in detail the Board's complaint file and I note that the complaints staff were very aware of the protracted timescales and made numerous attempts to obtain and clarify responses from the relevant staff members. Although Mr C's admission on 15 July 2005 was brief, 15 hours in total, he was admitted to the care of three departments; A&E, MAU and CCU. Certain departments were asked to comment both on Mrs C's initial letter of complaint and her follow-up letter. Initial (and follow-up) responses were sought from CCU, A&E (and the renal service), but do not appear to have been sought from MAU. The responses from both A&E and CCU suggest agreement between medical staff that there was not sufficient evidence for an immediate admission to CCU from A&E or the administering of thrombolytic drugs as the first ECG was inconclusive. However, both departments suggest in their responses that the second ECG should have prompted such action and consider it a fault that it did not. There was disagreement, however, about the competence of the interpretation of the first ECG which the complaints staff recognised and sought to clarify with senior medical staff.

38. At my meeting with the Board staff agreed that the initial response to Mrs C had not been helpful and told me that a significant number of operating changes had occurred with the Complaint and Advice team process for handling complaints and this complaint would be handled differently now. There is now more experienced clinical input to complaint responses and this has helped raise the standard of responses.

(c) Conclusion

39. There were clearly unacceptable delays in providing Mrs C and the Ombudsman's office with written responses, although the Board have apologised for these delays. I am in agreement with the Adviser that these events were not complex, but I am conscious that the complaints were extremely sensitive and serious. Complaints staff were in the difficult situation of having internally conflicting medical views which they sought to resolve. Unfortunately this difference of views (while important) appears to have distracted the Board from the serious doubts being raised about Mr C's care within the MAU. It is not clear to me why MAU were not asked to comment either on Mrs C's complaint or on the criticisms of the care and treatment delivered by them being made by other departments. Copies of the complaint were passed onto the Clinical Group Manager and the Clinical Team Manager of MAU but 'For Information' only.

40. I conclude, therefore, that the Board failed to handle the complaint properly not only in allowing unacceptable time delays but, more importantly, in failing to properly investigate several serious concerns raised during the internal investigation of this complaint. I also consider the Board failed in that even where it recognised that there had been failings, for example, that Mr C should have been admitted to CCU after the second ECG but wasn't, it has apparently taken no remedial action to learn from this complaint and ensure that no repetition of this failure occurs. It is widely recognised within the NHS that acknowledging errors and ensuring lessons are learned from complaints is an essential and integral part of complaint handling and improvement of service delivery. In all the circumstances, I uphold this aspect of the complaint.

(c) Recommendation

41. In light of this conclusion and the action already taken by the Board to improve complaint handling the Ombudsman recommends that the Board apologise in writing to Mrs C for their failure to provide an adequate or timely response to her complaint.

42. The Ombudsman further recommends that the Board ensure that their complaints handling process both acknowledges any errors identified and uses these to drive service improvement.

18 July 2007

Annex 1

Explanation of abbreviations used

Mrs C	The complainant
Mr C	The aggrieved
The Hospital	Ninewells Hospital, Dundee
The Board	NHS Tayside Health Board
The Adviser	A medical adviser to the Ombudsman
Consultant 1	The Consultant at the Renal Clinic on 13 July 2005
Doctor 1	The admitting doctor in A&E on 15 July 2005
Registrar 1	The doctor who reviewed Mr C in MAU at 19:55 on 15 July 2005
SHO 1	The SHO from CCU who reviewed Mr C at 03:00 on 16 July 2005
SHO 2	The SHO from MAU who was responsible for Mr C until he was transferred to CCU on 16 July 2005
Consultant 2	The Consultant Cardiologist who reviewed Mrs C's complaint for the Board

Annex 2

Glossary of terms

A&E	Accident and Emergency
Acute Coronary Syndrome	An umbrella term used to cover any group of clinical symptoms compatible with acute myocardial ischemia / chest pain due to insufficient blood supply to the heart muscle that results from coronary artery disease (also called coronary heart disease)
Angina	Chest discomfort that occurs when the blood oxygen supply to an area of the heart muscle does not meet the demand
Cardiac Arrest	Sudden cessation of heartbeat and cardiac function, resulting in the loss of effective circulation
CCU	Coronary Care Unit
ECG (cardiogram)	Test that shows a heart's rhythm by studying its electrical current patterns
GTN	Glyceryl trinitrate used to treat angina and heart failure
LBBB	Left Branch Bundle Block - a condition in which activation of the left ventricle is delayed, which results in the left ventricle contracting later than the right ventricle

Lisinopril (generic name)	A drug which narrows blood vessels and thereby maintains blood pressure
MAU	Medical Assessment Unit
Myocardial Infarction	Commonly known as a heart attack
Thrombolytic	Drugs that dissolve clots
TPR	Temperature, Pulse and Respiration
Troponin T	'A' cardiac troponins (proteins) are a marker of all heart muscle damage
Ulcerative Colitis	An ulceration of the lining of the colon
Ventricular Failure	A failure of one of the chambers (ventricles) of the heart which receive blood