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Appropriateness of Troponin test requests from cost efficacy and safety prospective, Cardiology department Loughlinstown Hospital Dublin.

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Abstract

It has been convincingly shown that the release of Troponin I or Troponin T is associated with high likelihood of adverse events in patient with unstable Coronary artery disease
Cardiac troponin I or T are contractile proteins found only in cardiac myocytes and are preferred selective biomarkers for the presence of cardiac necrosis Determination of blood troponin levels is an important diagnostic aid in identifying low-risk patients who can be discharged early and high-risk patients who must be treated aggressively. According to the recommendations of the ESC/ACC Committee for the Redefinition of Myocardial Infarction, troponin tests can be ordered for patients with acute chest pain at admission, 6 to 9 hours later, and again at 12 to 24 hours if results from earlier specimens are negative and the clinical index of suspicion is high. However, these results should be interpreted with caution. Although troponins are more sensitive and specific for myocardial injury, they can be seen in other non ischaemic cardiac conditions (advanced heart failure and acute pericarditis) and in the setting of renal insufficiency

Initiating the full ACS (Acute coronary syndrome) protocol in patients presenting with a positive troponin is not without its risks. Indeed, the Combination of aspirin 300mg, clopidogrel 600 mg / OR Prasugrel 60 mg, and heparin can Cause potentially lethal bleeding. This stresses the importance of using theTroponin test with discernment so as to make informed choices on treatment that we administer to patients .Furthermore, there are also financial repercussions of inappropriate troponin tests. Each troponin test processed actually costs 26 €. In this era of austerity, this is definitely something we should be careful about it. The appropriateness of troponin tests will no doubt become even more critical in the era of rapid bedside tests which is virtually accessible by vast majority of staff.

Aims

The purpose of this audit was to ascertain whether troponin tests are requested appropriately for acute admissions via A&E at Loughlinstown Hospital, Dublin. The need for such an audit been

raised and pushed hardly by our cardiologist ,since the continuous concern noticed by him with regard the huge rising numbers of inappropriate troponin request which implemented negatively in the hospital budget.

The primary outcome was whether troponin tests were requested appropriately. "Criteria for appropriateness of requests were decided after discussion with our cardiologist".
The secondary outcome was whether the troponin tests were requested within an appropriate time frame, i.e. at admission and at 12 hours, as been suggested by NICE guidelines
Troponin tests are not 100% specific and are not unexpensive test particularly we have spent 127,000 Euros last year (2012).

Method

Data was collected prospectively and randomly from all admissions to A&E.Admissions were monitored through a combination of reading A/E notes or follow up admission clinical notes in the ward and medical records.

For the first audit cycle the sampling period was **15/01/2013 to 15/02/13.**
For the second audit cycle the sampling period was **15/05/2013 to 15/06/13**

Based on NICE guidelines criteria (Taking into account the clinical presentation, the time from onset of symptoms and the resting 12-lead ECG findings when interpreting troponin measurements) for requesting troponin as well as the local hospital policy been set up by the cardiologist see **Table 1**.

Data were collected using a Performa shown below **(Table 2).**

The test that was being looked at was Troponin-I for all patients.

Table 1: **Criteria for appropriateness of request.**

Chest pain of any nature
Breathlessness and pulmonary oedema on CXR
Breathlessness and new ECG changes or abnormal admission ECG if no previous
Syncope with new ECG changes or abnormal admission ECG if no previous.
Unexplained hypotension and new ECG changes or abnormal admission ECG if no previous
Stroke/TIA only if new ECG changes or abnormal admission ECG if no previous
New onset AF or atrial flutter
Sepsis only if new ECG changes or abnormal admission ECG if no previous
Congestive cardiac failure if new ECG changes or abnormal admission ECG

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Table 2: Data collection.

Date of admission
Patient's Hospital Number
Age
Presenting complaint to the A&E
Appropriateness of troponin-I test
Timing of test (hours post admission)
Test result
Action taken as result
ECG finding and correlation that with diagnosis.

Result

For the first cycle, a total of 55 acute admissions had one or more troponin tests carried out in ED. The average patients age was 67.7 years. Overall, approximately
50 % of patients were male, and 51% female. Of the 55 patients, 1 was admitted through OPD and the majority through A&E. Over this one month, we found 32 appropriate troponin-I tests. The remaining requests were deemed inappropriate as per the criteria outlined earlier. This means that 23 tests, i.e. 41.8 % of the troponin-I tests requested for consecutive admissions over the month audit period were requested inappropriately. The cost of the inappropriate troponin-I tests totalled 600 Euros.

Interestingly, from the 55 patients we carried out (in the first cycle) only 3 patients have positive Tropoin , 2 of them neither turn out to be ACS when they had their invasive Cardiology testing, the first patient was having high troponin by virtue of acute kidney injury secondary to sepsis and the second patient had completely normal angiogram and further tests confirmed perimyocarditis.Last patient had positive troponin in context of new LBBB and eventually deemed not suitable for invasive test.

The average time for the first troponin test was 9.45 Hours (NICE guidelines recommend repeat troponin testing at 12 hours).
From the total number of patients who had a troponin test, 5 were started on ACS protocol, inappropriately **(Table 3)**

The cost of totalled 127.000 Euros for last year (2012) and up to the time of this audit specifically the second cycle (June, 2013) we spent 51,000 Euros.

Presenting complaint	1st troponin	2nd troponin	Final diagnosis	ACS started?
SOB, Low HB 6.4	12 H NEG	NEG	SYMPTOMATIC ANAEMIA	NO
SOB	12 H NEG	NEG	PNEUMONIA /UTI	NO
WEAK DIZZINESS	12 H NEG	NEG	TIA	NO
EPIGASTRIC PAIN	12 NEG	NEG	CHOLYCYSTITIS	NO
SOB ON BG OF COPD	12 NEG	NEG	INFECT EXAC COPD	NO
SOB,COUGH UNWELL	12 NEG	NEG	PNEUMONIA	NO
EPIGASTRIC PAIN A/W OGD	12 NEG	NEG	GORD	NO
SOB,EPIGASTRIC PAIN	12	NEG	COPD	NO
FALL ,CONFUSION	12	NEG	PNEUMONIA	NO
SOB ,LOWER ABD PAIN	12	NEG	PNEUMONIA	NO
CONFUSION,L/L WEAKNESS	12	NEG	L/L CELLULITIS	NO
SOB ON MINIMAL EXERSION	12	NEG	CCF/PNEUMONIA	NO
COLLAPSE	4 HRS NEG	NEG	VIRAL ILLNESS	NO
WHEEZE ,SOB	12 NEG	NEG	COPD	NO
FALL	12	NEG	MECHANICALL FALL	NO

Presenting complaint	1st troponin	2nd troponin	Final diagnosis	ACS started ?
SOB,HAEMOPTYSIS ,LOW BP	12 NEG	NEG	CA LUNG RIP	NO
LOWER LIMB PAIN ,WEAK	12H	NEG	GASTROENTRITIS	NO
LEFT ELB OW HAND PAIN	12 H	NEG	MUSCULOSKLETAL PAIN	NO
NAUSEA & VOMITING	6 H NEG	N/V	GASTROENTRITIS	NO
COLLAPSE	3 H NEG	N/V	PNEUMONIA/UTI	NO
SOB	3 H NEG	N/V	CELLULITIS	NO
SOB ,ANKLE SWELLING	11	N/V	EXAC COPD	NO
LEST UPPER LOWER WEAKNESS	10 NEG	N/V	TIA	NO

Result of Re Audit

As mentioned above, the second audit cycle data collection took place 15/05/2013 to 15/06/13
We found that from total 55 acute admissions through ED during the period stated above, only 12 were inappropriate according to the criteria set up earlier, average time for requesting initial trop was 9.1 hours .and only 2 patients this cycle started on ACS protocol unnecessarily. However the other 3 patients who started on ACS protocol were truly needed to do so.

Discussion

Although there were still 12 inappropriate Troponin-I requests in the second audit cycle, our education through grand round meeting (in particular by our cardiologist through many announcement) as well as spread the education around among ED staff brought a significant drop in the number of inappropriate troponin tests requested in the emergency department by almost half of the number noticed in the first cycle (12 compare to 23 in first cycle).

In terms of the time frame for requesting troponin, we have noticed that both cycle the time during which troponin was requested was relatively reasonable and more or less complying with the Nice guidelines when we look at the average time that the troponin was requested in both first cycle and re cycle were keeping with average of 9.45 and 9.1 hours respectively. That presumptively, if we had accounted any troponin taken after 12 hours from the events is 12 hours, doesn't matter that is 24 hours or one week after events, for sake of easiness of calculations.

We noticed in light of this Audit the ED Staff comply with above mentioned criteria for requesting Troponin and accordingly they initiated their own audit cycle .Obviously that as a part of large audit for other tests such as coagulation profile and D.Diamer request and the loop left open in the hands of ED team.

The set up dates for running the cycles of the audit was simultaneous with the time of the start rotation of the NCHDs between hospitals.albiet, some of the staff were rotated with in sight the hospital, to do their ED rotation, we noticed the lack of awareness amongst the emergency department staff regarding the requesting of troponin in patients admitted acutely unwell.
Noticeably, one patient noticed to have 7 troponins taken in interval of less than a week and eventually the patient been diagnosed with Lung Cancer .Indeed such irresponsible troponin requests means that huge financial resources (186 €) taken up by inappropriate requests.

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