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Data Article

Datasets describing the introduction of the high-sensitive troponin in the emergency department

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ABSTRACT

Chest pain is a common clinical condition in the emergency department. A high sensitive (hs) troponin test assay may help to identify patients with acute coronary syndrome earlier compared to conventional tests but also entails the risk of a high proportion of positive test results in patients without cardiac disease. We assessed the impact of the introduction of the hs-troponin test in clinical practice in an emergency department.

We compared December 1, 2009 until November 30, 2010 (standard test period) to December 1, 2010 – the date of the introduction of the hs-troponin assay – until December 31, 2011 (hs troponin test period) of patients presenting with chest pain to one of the ten largest hospitals in Switzerland.

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We identified electronic health records using the following ICD-10 codes: R06.4 (hyperventilation), R07.1 (chest pain when breathing), R07.2 (precordial pain), R07.3 (other chest pain), and R07.4 (chest pain not specified), I20 (angina pectoris), I21 (acute MI), I22 (recurrent MI), I23 (complications after acute MI), and I24 (other acute ischemic heart disease). Included were all medical records of adult patients ($\geq$18 years) presenting to the ED with chest pain and with $\geq$1 troponin test. Excluded were records without troponin test, pregnancy, trauma patients/life-threatening conditions, malignant disease, current fracture, renal replacement therapy/severe kidney failure (creatinine clearance $<$30ml/min/1.73m^2), patients with disability, or patients disagreeing that their data will be used for scientific purposes.

Two researchers screened all records for in-/exclusion. The first presentation for chest pain to the ED and all presentations within the following three months extracted. Presentations after $>$3 months due to chest pain were defined as a new index visit of a second episode. The extraction form with predefined variables was pilot-tested in 20 records. Additional diagnostic tests were ECG, treadmill test, coronary angiography, MIBI scintigraphy, echocardiography, chest X-ray, computer tomography (CT) of the chest or abdomen, sonography of the abdomen or pleura, gastroscopy, and lung function tests.

We compared the number of non-invasive / invasive cardiac diagnostic tests in troponin positive and negative patients and the number of diagnostic tests after the exclusion of patients with STEMI diagnosis. Non-invasive / invasive cardiac tests included treadmill test, coronary angiography, MIBI scintigraphy, and echocardiography. We calculated average monthly tests per patient and compared mean tests per patient between groups. We used a t-test to quantify the evidence for differential number of diagnostic tests per patient in each period. Between-group differences were estimated with 95% confidence intervals. All analyses were performed with the statistical software R for windows [1].

Interpretation of this data can be found in a research article titled Impact of the introduction of high-sensitive troponin assay on the evaluation of chest pain patients in the emergency department: a retrospective study [2]).

Specifications table

Subject	Emergency Medicine
Specific subject area	We assessed whether the introduction of the hs-troponin assay resulted in downstream testing in patients presenting with chest pain to an emergency department.
Type of data	Table Figure Data Codes

(*continued on next page*)

How data were acquired	Retrospective chart review. Data extraction methods have been previously described [3]. The local ethics committee approved the study (KEK-ZH number 2014-0506) in December 2014. All analyses were performed with the statistical software R for windows. Standard test period: Troponin T-Test Assay: CARDIAC T, Ref. 04491815 190, Cobas®, Roche) was used with a limit of detection 0.01ng/ml troponin T and a cut-off of ≥0.01ng/ml [4]. Hs-troponin test period: Troponin T hs STAT assay, Ref. 05092728190 V8, Cobas®, Roche (fourth generation hs-troponin T assay). Limit of detection of 0.003ng/ml troponin. The cut-off for pathological hs-troponin values was defined at ≥0.014ng/ml, the 99. percentile of the reference population (coefficient of variation <10% [5]). None of the assay batches known to have calibration errors (batch numbers 157120, 160197, and 163704, produced between October 2009 and April 2012, with the latest expiration date of October 2012) were used.
Data format	Raw source data Analyzed Filtered
Parameters for data collection	Primary diagnosis Troponin test result: positive / negative Number of additional tests: ECG, treadmill test, coronary angiography, MIBI scintigraphy, echocardiography, chest X-ray, computer tomography (CT) of the chest or abdomen, sonography of the abdomen or pleura, gastroscopy, lung function tests
Description of data collection	Retrospective chart review. Two researchers screened all records. The first presentation for chest pain to the ED and all presentations within three months were considered and extracted. Presentations after >3 months due to chest pain were extracted as a new index visit of a second episode. Data were extracted into a predefined extraction form. One researcher not involved in the extraction process assessed the data extraction quality. The final diagnosis was based on the diagnosis of the discharge letter or, in patients with follow-up visits / readmissions, adjudicated by a committee not involved in the data extraction and blinded to the discharge diagnosis of the first letter.
Data source location	Institution: Kantonsspital Winterthur City/Town/Region: Winterthur Country: Switzerland
Data accessibility	The data is hosted on a public repository. Repository name: Mendeley.com Data identification number: 10.17632 Direct URL to data: http://dx.doi.org/10.17632/nktjd25y6k.1
Related research article	Jakob M. Burgstaller, Ulrike Held, Isaac Gravestock, Benjamin S. Klauser, Laura M. Gort, Lina Melzer, Susann Hasler, Tenzin D. Bierreth, Sarah E. Müller, Johann Steurer, Maria M. Wertli, Impact of the introduction of high-sensitive troponin assay on the evaluation of chest pain patients in the emergency department: a retrospective study, Am J Med, in press [2].

Value of the data

- This data article represents data and additional analyses based on methods used in the original article and provides detailed insight in how the introduction of the hs-troponin assay influenced the diagnostic assessment in patients presenting with chest pain to the ED.
- The data will benefit clinicians and researchers because they provide a detailed description of a real-life setting.
- The dataset includes data for all patients. This data will allow other researchers to compare their own data and to perform patient independent meta-analyses.
- The data may benefit other researchers and clinicians to develop effective algorithms on how to test patients presenting with chest pain to the ED.

Effective algorithm to assess and identify patient at risk for acute coronary syndrome without overtesting may benefit the healthcare system in the long term.

Table 1
Average diagnostic test before and after the introduction of the hs-troponin test.

	Troponin I test Mean (SD)	Hs-Troponin Mean (SD)	Comparison Troponin I vs. Hs-Troponin period Beta (95% CI)	p-value
non-invasive / invasive cardiac diagnostic tests‡ in trop+ patients	1.2 (0.7)	1.0 (0.7)	0.20 (0.04 - 0.35)	0.012
non-invasive / invasive cardiac diagnostic tests‡ in trop- patients	0.3 (0.6)	0.2 (0.5)	0.16 (0.09 - 0.23)	<0.001
Diagnostic tests§ in trop+ patients without STEMI patients	3.2 (0.9)	2.9 (1.0)	0.35 (0.09 - 0.60)	0.008
Diagnostic tests§ in trop- patients without STEMI patients	2.2 (1.1)	1.7 (0.8)	0.44 (0.32 - 0.56)	<0.001

SD, standard deviation; CI, confidence interval.
‡Non-invasive / invasive cardiac tests: treadmill test, coronary angiography, Mibi-scintigraphy, and echocardiography.
§Average number of additional test: ECG, coronary angiography, Mibi-scintigraphy, echocardiography, treadmill test, chest X-ray, computer tomography (CT) of the chest or abdomen, sonography of the abdomen or pleura, gastroscopy, lung function tests.

1. Data description

The dataset in this article describes the number of diagnostic test before and after the introduction of the hs-troponin test. In Table 1 the average monthly tests for two analyses are summarized: non-invasive / invasive cardiac tests, overall diagnostic tests after the exclusion of STEMI patients. Fig. 1a describes the average overall monthly number of non-invasive and invasive cardiac tests per patients in the full patient sample ($n = 1274$). Fig. 1b describes the average monthly number of non-invasive and invasive cardiac tests per patients with positive and negative troponin test for all patients ($n = 1274$). Fig. 2a describes the average overall monthly number of diagnostic tests per patients after exclusion of patients with STEMI diagnosis ($n = 1173$). Fig. 2b describes the average monthly number of diagnostic tests per patients with positive and negative troponin test after exclusion of patients with STEMI diagnosis ($n = 1173$).

In the repository, a dataset describes the raw data required to replicate the analysis on average monthly number of tests. The code file describes the codes used for the analysis for the statistical software R.

2. Experimental design, materials, and methods

2.1. Design and data

Data includes records from a single-center, retrospective medical chart review of patients presenting to one of the ten largest hospitals in Switzerland, the cantonal hospital Winterthur (>30′000 ED visits annually), between December 1, 2009 and December 31, 2011. This time period was chosen because on December 1, 2010 a hs-troponin assay was implemented and in January 2012 an outpatient clinic near the hospital opened and many eligible patients were treated elsewhere.

Data includes 1,274 patient records of ED visits with at least one troponin test (597 in the standard troponin T and 677 in the hs-troponin test period) between December 1, 2009 and December 31, 2011. The data includes 1274 patient records with at least one troponin test (597 in the standard troponin T and 677 in the hs-troponin test period).

2.2. Material

Data extraction methods have been previously described [3]. Two researchers (TD, SM) screened all 3000 records with the ICD-10 codes (R07.1-4 ($n = 2438$) and I20-24 ($n = 562$) for inclusion. Overall, 1,467 records (6.6%) met the inclusion criteria and were extracted.

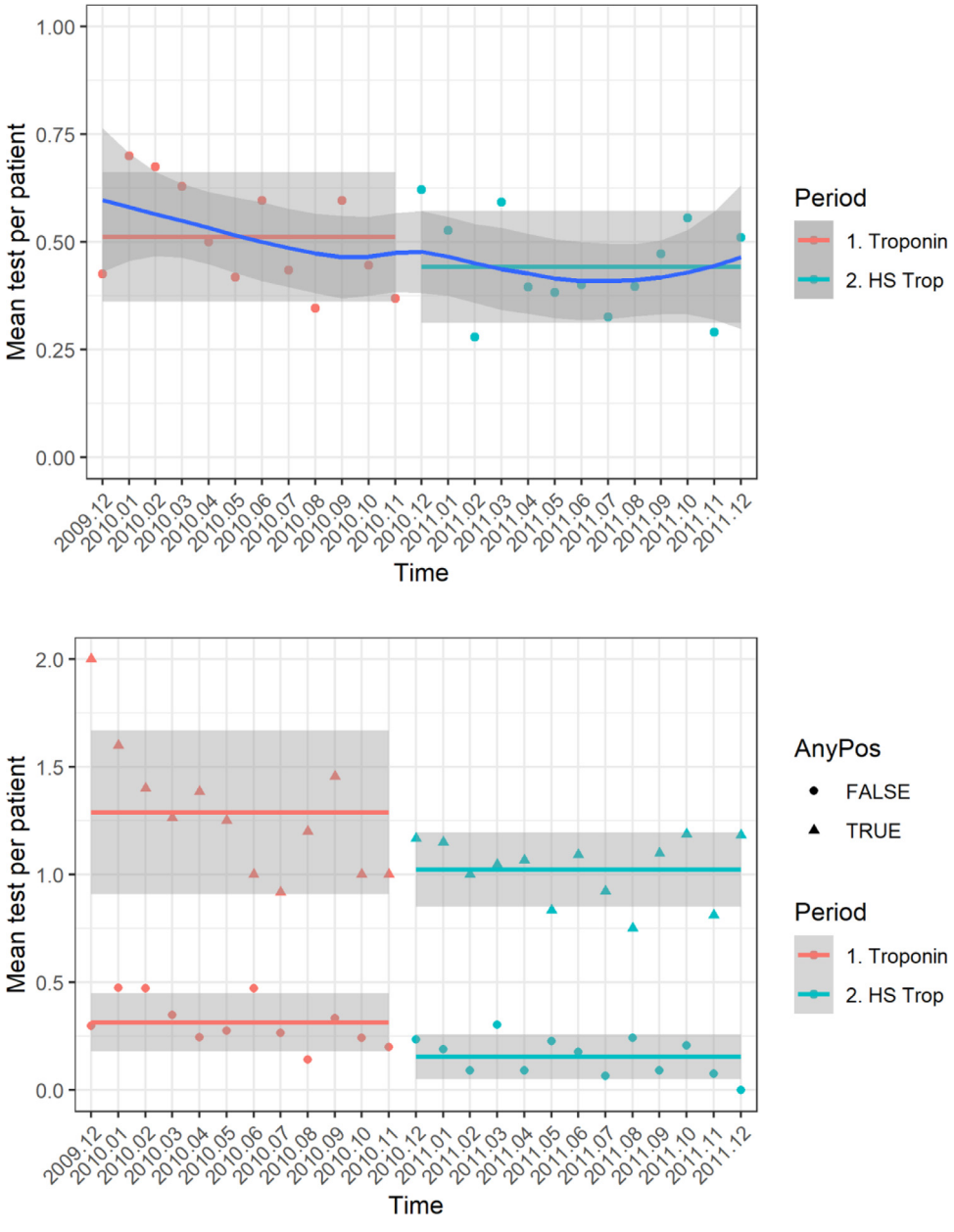

Fig. 1. a) (top figure): Average overall monthly number of non-invasive and invasive cardiac tests per patients in the full patient sample (n = 1,274); b) (figure below): Average monthly number of non-invasive and invasive cardiac tests per patients with positive and negative troponin test for all patients (n = 1,274)

Data were extracted into a predefined extraction form. Data extraction quality of six predefined parameters (troponin test result, pain reproducible by movement, coronary angiography, recommendation for further diagnostic evaluation, recommendation for further treatment, and the discharge diagnosis) in 379 (26%) ED visits showed an overall error rate was 5.4%, 95% confidence interval (CI) 4.5–6.4); the error rate for the troponin values was 0.8%, 95%-CI 0.2–2.5).

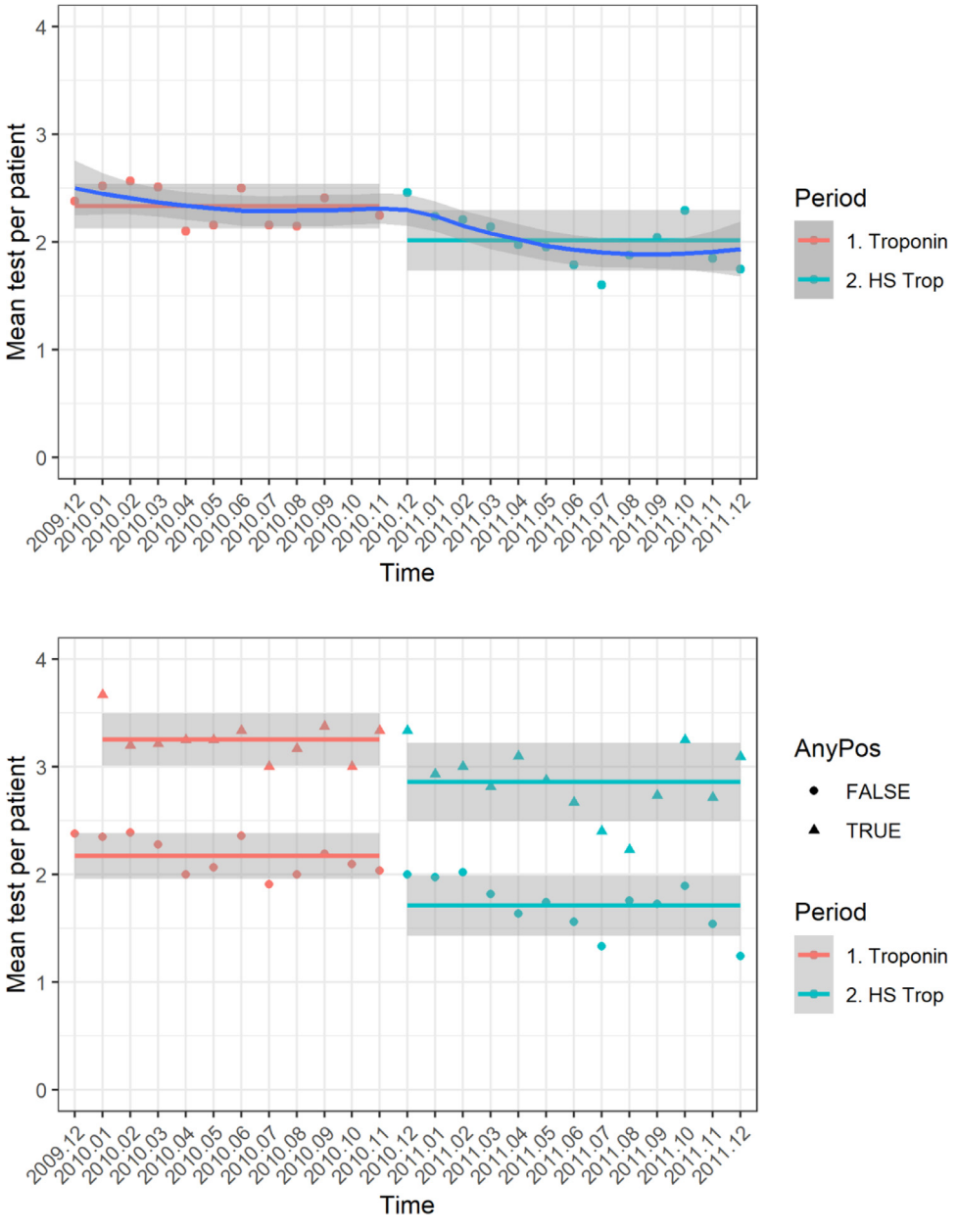

Fig. 2. a) (top figure): Average overall monthly number of diagnostic tests per patients after exclusion of patients with STEMI diagnosis (n = 1,173). b) (figure below): Average monthly number of diagnostic tests per patients with positive and negative troponin test after exclusion of patients with STEMI diagnosis (n = 1,173).

The final diagnosis used for the primary outcome was based on the diagnosis of the discharge letter or, in patients with follow-up visits / readmissions, adjudicated by a committee not involved in the data extraction (JS, UH, JB, MW) and blinded to the discharge diagnosis of the first letter. First, one of us (BK) reviewed all records of follow-up visits to the hospital (ED visits, outpatient treatment, and hospitalizations) within three months after the initial

ED consultation for changes in the discharge diagnosis. Out of 263 episodes with additional visits, 163 (62%) were related and 100 (38%) were not related to the index visit. Second, the independent committee reviewed all available medical records (clinical findings, imaging studies, non-invasive and invasive diagnostics, laboratory tests and discharge letters) of the follow-up evaluation or hospitalization of all 163 potentially related visits and adjudicated the final diagnosis. In 148 visits (90.7%) the primary diagnosis was confirmed. Changes in the final discharge diagnosis were adjudicated from unclear chest pain in 15 visits (5.8%) to acute coronary syndrome in 3 patients (1.1%: NSTEMI $n = 1$, unstable angina $n = 2$), stable angina without acute coronary syndrome in 5 patients (1.9%), cholecystitis / choledocholithiasis in 3 patients (1.1%). The diagnosis was changed in one patient to an upside-down stomach (0.3%), polyserositis (0.3%), or disseminated tuberculosis (0.3%), respectively.

2.3. Methods

We compared the number of non-invasive / invasive cardiac tests (i.e. treadmill test, coronary angiography, MIBI scintigraphy, and echocardiography) and the number of diagnostic tests after the exclusion of STEMI patients. We calculated average monthly tests per patient and compared mean tests per patient between groups. We used a t-test to quantify the evidence for differential number of tests per patient record in each period. Between-group differences were estimated with 95% confidence intervals. All analyses were performed with the statistical software R for windows [1].

To access the data and the full codes please go to http://dx.doi.org/10.17632/nktjd25y6k.1.

Acknowledgments

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships, which have, or could be perceived to have, influenced the work reported in this article.

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