



Clinical value of drugs of abuse point of care testing in an emergency department setting



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ARTICLE INFO

Keywords:

Intoxications
Drug tests
Point of care testing
Drugs of abuse

ABSTRACT

Objective: Toxicology screening tests for drugs-of-abuse and therapeutic drugs in urine (TST-U) are often used to assess whether a patient's clinical condition can be explained by the use of drugs-of-abuse (DOA) and/or therapeutic drugs. TST-U have clinical value when they support clinical decision making by influencing diagnosis and patient care. We aim to quantify the influence of TST-U results on diagnosis and patient care in an emergency department. Our secondary objective is to identify specific patients for which a TST-U is most warranted or mostly unhelpful.

Methods: This prospective observational study was performed at the emergency department of a middle-sized urban teaching hospital. A point of care TST-U has been used in this department for three years. When a TST-U is considered indicated by a physician, the influence of the TST-U result on diagnosis and patient care is quantified before and after the test results are available, by means of a questionnaire. Urgency and complaints upon admission have also been registered.

Results: Of 100 TST-U results 37% were reported having a substantial influence on diagnosis and 25% on patient care. TST-U had a substantial influence on diagnosis in 48% of patients with decreased consciousness, 47% of patients with psychiatric symptoms and in 47% of patients with "other" complaints. In this last category patients with neurological symptoms benefited most. In patients who were already suspected to be intoxicated, only 18% of the TST-U results had substantial influence on diagnosis.

Conclusions: The use of point of care TST-U in an Emergency Department helps physicians to understand the clinical condition of a patient. They influence the way a patient is treated to a lesser extent. These tests are most helpful in patients with decreased consciousness, psychiatric or neurological symptoms and mostly unhelpful in patients who, upon admission, are already known to be intoxicated.

1. Introduction

1.1. Background

For adequate diagnosis and treatment in an acute setting, such as an Emergency Department, it is often important to know if the patient's clinical condition can be explained by effects of drugs-of-abuse (DOA) or therapeutic drugs. Comprehensive toxicology screening may detect drugs of abuse and therapeutic drugs in various biological specimens. Towards this end, various toxicology screening methods have been developed in different biological matrices, including blood, urine, hair and oral fluid. These screenings methods include immunoassays and chromatography assays, requiring specific and often time-consuming specimen treatments. Further, in an Emergency Department setting the choice and feasibility of sampling may depend on the clinical condition of the patient [1–10].

In most hospitals in the Netherlands, toxicology screening of drugs of abuse and therapeutic drugs in blood or urine takes place in central laboratories. Toxicology screening in central laboratories can be quite time-consuming and expensive, depending on laboratory techniques and trained personnel. Also, transportation issues and laboratory procedures may delay patient management and treatment, especially outside the office hours. A reliable bedside test for screening patients for drugs of abuse and therapeutic drugs, with an easy test protocol and instantaneous result, is often desired in the ED. There are many on-site testing devices (also called point-of-care tests) for drugs of abuse and therapeutic drugs that are commercially available [11–16]. Urine is by far the most widely used biological matrix for this purpose. Point-of-care tests currently available are based on competitive binding immunoassay to qualitatively determine the presence of drugs, and do not require difficult specimen treatment or sophisticated instrumentation. Results are generally available within 5–10 min. Most point-of-care

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tests have a multiple drug panel. When applied in a laboratory setting, many of these devices, especially those developed in the past decade, have been shown to produce reliable results [11–16]. Therefore we introduced point-of-care toxicology screening tests in urine (TST-U) for a number of frequently encountered DOA and therapeutic drugs to our emergency department [16].

1.2. Importance

Since the introduction of point-of-care TST-U to our emergency department (three years ago) these tests are frequently used (approximately 20 each month). Though the costs per test are relatively low, it is important to know whether TST-U have clinical value and if they can be used more effectively. For a TST-U to have clinical value, it should support clinical decision making by influencing diagnosis and patient care.

Several studies have been performed to assess the clinical value of TST-U in the emergency department, with contradicting results. Some researchers state that they have diagnostic value, are effective, less costly than conventional tests, decrease turnaround time and length of stay [17–19]. Other studies conclude that urine drug screening rarely influences patient care, does not improve clinical management, could be expensive and potentially inaccurate [15,20,21]. Only one study prospectively evaluated the effect of TST-U on patient care in the emergency department. In this study the test was performed by a central laboratory. Physicians were interviewed by an investigator before and after revealing the test results. They concluded that TST-U are rarely helpful in guiding patient care decisions in the emergency department, but did not investigate the diagnostic value [21].

1.3. Goals of this investigation

In this study we aim to quantify the diagnostic value of TST-U results and their influence on patient care. Our secondary objective is to identify specific patients for which a TST-U is most warranted or mostly unhelpful.

2. Materials and methods

2.1. Study design and setting

This study was designed as a non-comparative, prospective, observational study. No interventions were made. In cases where a physician ordered a TST-U to be conducted, he/she specified the influence of the test result on diagnosis and patient care after the result is revealed. The study procedure is shown in Fig. 1.

The study was performed at the Emergency Department (ED) of the Onze Lieve Vrouwe Gasthuis (OLVG) in Amsterdam, the Netherlands. The OLVG is a middle-sized (555 bed) urban teaching hospital, located in inner Amsterdam. With more than 50.000 patients annually, the

- 1 TST-U is ordered by the physician
- 2 Nurse hands a questionnaire to the physician
- 3 Physician specifies the initial differential diagnosis and intended treatment
- 4 Nurse performs the test
- 5 Nurse verifies initial differential diagnosis and intended treatment are specified
- 6 Nurse reveals the TST-U result
- 7 Physician specifies differential diagnosis and intended treatment considering the TST-U result
- 8 Physician specifies the influence of the TST-U result on diagnosis and patient care using a 5 point scale

emergency department of the OLVG is the largest Emergency Department in the Netherlands. Physicians are often confronted with patients that are suspected of drug abuse and/or overdose.

2.2. Selection of participants

Annually approximately 50,000 patients visit the ED of the OLVG. TST-U are ordered in approximately 0.5% of all ED-presenting patients. All patients admitted to the emergency department, for whom a TST-U were considered by the physician were eligible for inclusion into the study. Every single patient has been included only once per hospital visit. All ED-physicians were trained in certified acute care and toxicology courses by means of continuing professional education. In addition, all ED physicians were trained on the job by the investigators on the potentials and limitations of TST-U and how to interpret the TST-U results.

This study was approved by the Medical Ethics Committee of the Onze Lieve Vrouwe Gasthuis, Amsterdam. During this study the TST-U were applied as in routine clinical practice. Patients were not treated differently or asked to do anything different than in cases of routine clinical practice. Therefore informed consent was not required.

2.3. Point-of-care-testing (TST-U)

Toxicology screening was performed using the Triage® TOX Drug Screen (Biosite Diagnostics, San Diego, U.S.A.). This competitive fluorescence immunoassay can be used to determine the presence of DOA and a panel of therapeutic drugs in urine. The drug panel consists of amphetamine, methamphetamine, barbiturates, benzodiazepines, cocaine, methadone, phencyclidine, opiates, tetrahydrocannabinol (THC, the main active component of cannabis), and tricyclic antidepressants. Tests were performed on-site by emergency department nurses. Users were periodically trained by laboratory technicians of the Department of Clinical Pharmacy. A test yielded a positive result in case the amount of drug in urine exceeded a certain threshold. Results were available within 10 min. The interpretation of the results was non-subjective, because the test results were not visibly read but measured by the Triage Reader. Sensitivity and specificity for each of the measured compounds is high. The device has built-in quality controls and is capable of electronic record keeping [16].

Routinely, ED physicians orders TST-U in cases of suspected intoxications. The ED nurse labels a urine container with the specific patient data. The ED physician or nurse collects urine from the patient. The ED nurse performs the test as described earlier [16]. For this study purpose, the ED nurse handed a questionnaire to the physician before the test was performed. The physician registered the initial differential diagnosis and intended treatment. The nurse performed the test. Also, the nurse verified whether differential diagnosis and intended treatment had been specified. Thereafter, the nurse revealed the TST-U result to the physician. Then, the physician specified the differential

Fig. 1. Study procedure.

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