

Performance Evaluation of Four On-Site Drug-Testing Devices for Detection of Drugs of Abuse in Urine

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Abstract

On-site drug tests are becoming increasingly more popular because of their easy test protocols and instantaneous results. This study evaluates the performance of four on-site drug testing devices that use competitive binding immunoassays to qualitatively determine the presence of drugs in urine: Triage[®] Panel for Drugs of Abuse plus TCA, QuickScreen[™] Pro-Multi Drug Screening Tests, Syva[®] Rapid Test d.a.u.[™] 5 and d.a.u.[™] 2, and Rapid Drug Screen[™]. All devices simultaneously determine the presence of the following drugs of abuse: amphetamine (AMP), benzoyllecgonine (BE), 11-nor-9-carboxy- Δ^9 -tetrahydrocannabinol (THCA), opiates (OPI), and phencyclidine (PCP). Triage and Rapid Drug Screen also simultaneously test for benzodiazepines (BNZ) and barbiturates (BRB), whereas QuickScreen and Rapid Test require separate devices for the BNZ and BRB analyses. Urine specimens (222) containing drug concentrations around or above cutoff values were screened by ONLINE or EMIT II immunoassays. Of these, 199 yielded positive gas chromatography-mass spectrometry results with at least 17 positive specimens in each drug class. Specimens with the target drugs added at 16.7% above and below the cutoff, 33.3% above and below the cutoff, and 66.7% above the cutoff were also used to evaluate the test devices. Sensitivity and specificity calculations demonstrated that Triage performed most predictably in the donor urine specimens and the drug-added specimens. In addition, it required the least amount of test volume and was the only device in which the appearance of a colored line indicated a positive result. Therefore, of the devices studied, Triage was the most dependable and reproducible on-site drug-screening device.

Introduction

The Department of Health and Human Services reports that 11% of the population over the age of 12 (~24 million people) voluntarily admitted to using illicit drugs in 1996, with 6.4% of the population having used an illicit drug within one month (1). Because of such prevalence, emergency rooms, rehabilitation facilities, probation officers, drug counselors, and employers

screen for illicit drug usage. Primarily, drug screening eliminates the specimens/individuals who tested negative for certain drugs such that the more complex and time-consuming confirmation process is not overburdened. However, in the emergency room, screening also serves to identify drugs so that a patient will receive the appropriate treatment. Drug rehabilitation programs and justice departments use on-site screening devices to immediately verify compliance, and employers randomly screen employees to curtail absenteeism and workplace accidents. Therefore, on-site urine drug-screening devices need to be reliable and rapid. They must also be cost effective and simple to use because testing may be performed outside the laboratory by individuals with little training. On-site drug-screening devices attempt to fulfill these requirements.

The purpose of this study was to evaluate the ability of four on-site drug-screening devices to detect the presence of amphetamine (AMP), benzoyllecgonine (BE), 11-nor-9-carboxy- Δ^9 -tetrahydrocannabinol (THCA), opiates (OPI), phencyclidine (PCP), benzodiazepines (BNZ), and barbiturates (BRB) in urine: Triage Panel for Drugs of Abuse plus TCA, QuickScreen Pro-Multi Drug Screening Tests, Syva Rapid Test d.a.u. 5 and d.a.u. 2, and Rapid Drug Screen. All devices simultaneously determined the presence of five drugs of abuse: AMP, BE, THCA, OPI, and PCP. Triage and Rapid Drug Screen also simultaneously detected the presence of BNZ and BRB. QuickScreen and Rapid Test required separate test cards for BNZs and BRBs. Triage can also determine the presence of tricyclic antidepressants (TCA). However, TCAs were not analyzed in this study (2). All screening results were confirmed by gas chromatography in tandem with mass spectrometry (GC-MS).

Materials and Methods

Materials

Screening assays: Triage Panel for Drugs of Abuse plus TCA from Biosite Diagnostics (San Diego, CA), QuickScreen Pro-Multi Drug Screening Tests from Pharmatech (San Diego, CA), Syva Rapid Test d.a.u. 5 and d.a.u. 2 from Behring Diagnostics, Inc. (Cupertino, CA), and Rapid Drug Screen from American Bio Medica (San Diego, CA) were acquired. All devices utilized a competitive binding immunoassay to detect the presence of drugs in urine.

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Testing And Evaluation Of Drugs Of Abuse

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Handbook of Drug & Alcohol Studies Kim Wolff, Jason White, Steven Karch, 2016-10-18 With contributions from leading international academics across the biological sciences, this handbook takes a critical look at the key contemporary issues and debates in the field. The 31 chapters are divided into four parts: Part I Determination of Substance Misuse; Part II PK and PD in Relation to Patterns of Use; Part III Detection and Treatment of Drug and Alcohol Use; Part IV Controversies and New Approaches. This Handbook is an excellent reference text for the growing number of academics, students, scientists, and practitioners in the drug and alcohol studies community and will be a vital resource to the allied professions involved in workplace drug testing, clinical toxicology, and forensic science. **Biopsychosocial Assessment in Clinical Health**

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Compendium of HHS Evaluations and Relevant Other Studies ,1990 Conducting Child Custody Evaluations Philip M. Stahl,2011 Addresses key topics such as the best interests of the child custody and time share divorce and its impact on children and children s developmental needs Biomedical Index to PHS-supported Research ,1990 **The Use of**

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Table of Contents Testing And Evaluation Of Drugs Of Abuse

1. Understanding the eBook Testing And Evaluation Of Drugs Of Abuse
 - The Rise of Digital Reading Testing And Evaluation Of Drugs Of Abuse
 - Advantages of eBooks Over Traditional Books
2. Identifying Testing And Evaluation Of Drugs Of Abuse
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Testing And Evaluation Of Drugs Of Abuse
 - User-Friendly Interface
4. Exploring eBook Recommendations from Testing And Evaluation Of Drugs Of Abuse
 - Personalized Recommendations
 - Testing And Evaluation Of Drugs Of Abuse User Reviews and Ratings
 - Testing And Evaluation Of Drugs Of Abuse and Bestseller Lists
5. Accessing Testing And Evaluation Of Drugs Of Abuse Free and Paid eBooks
 - Testing And Evaluation Of Drugs Of Abuse Public Domain eBooks
 - Testing And Evaluation Of Drugs Of Abuse eBook Subscription Services
 - Testing And Evaluation Of Drugs Of Abuse Budget-Friendly Options

6. Navigating Testing And Evaluation Of Drugs Of Abuse eBook Formats
 - ePub, PDF, MOBI, and More
 - Testing And Evaluation Of Drugs Of Abuse Compatibility with Devices
 - Testing And Evaluation Of Drugs Of Abuse Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Testing And Evaluation Of Drugs Of Abuse
 - Highlighting and Note-Taking Testing And Evaluation Of Drugs Of Abuse
 - Interactive Elements Testing And Evaluation Of Drugs Of Abuse
8. Staying Engaged with Testing And Evaluation Of Drugs Of Abuse
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Testing And Evaluation Of Drugs Of Abuse
9. Balancing eBooks and Physical Books Testing And Evaluation Of Drugs Of Abuse
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Testing And Evaluation Of Drugs Of Abuse
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Testing And Evaluation Of Drugs Of Abuse
 - Setting Reading Goals Testing And Evaluation Of Drugs Of Abuse
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Testing And Evaluation Of Drugs Of Abuse
 - Fact-Checking eBook Content of Testing And Evaluation Of Drugs Of Abuse
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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