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## VeriPharm: The Dispensing Gauntlet (UAE Clinical Edition)

### Documentation & User Guide

Release Date: December 2025

Platform: Universal (HTML5/JavaScript) - Client-Side Only

## 1. Introduction

**VeriPharm** is a browser-based clinical simulation tool designed for pharmacy students and technicians to train the critical skill of final verification ("checking"). Unlike static image quizzes, VeriPharm uses a dynamic rendering engine to generate infinite, unique dispensing scenarios, testing the user's ability to identify errors under pressure. It runs entirely on the client-side, ensuring fast performance and privacy.

### Key Features:

- **Infinite Asset Engine:** Uses advanced CSS 3D transforms to render drug bottles, labels, and prescriptions on the fly. No two sessions are exactly alike.
- **Progressive Difficulty:** Evolves from simple visual matching (Level 1) to complex clinical decision-making (Level 3) and high-stress survival modes (Level 4).
- **Clinical Logic Database:** Includes updated and extensive clinical pharmacy logic, detecting Drug-Disease interactions, **Contraindications (e.g., Penicillin Allergy)**, and Narrow Therapeutic Index (NTI) dosing errors.
- **Fatal Error System:** Simulates real-world consequences. Certain errors (e.g., Daily Methotrexate) trigger an immediate "License Revoked" state.
- **Competency Reporting:** Generates a detailed, printable "Competency Assessment Record" detailing every passed and failed scenario.

## 2. Core Concepts & Mechanics

Unlike standard quizzes, VeriPharm operates on a "Gauntlet" system. Understanding these mechanics is crucial for success.

### The "Exam Deck" System

- Each level consists of a pre-shuffled deck of 10 scenarios. The deck is algorithmically balanced to ensure a student faces a specific distribution of error types relevant to that level. You cannot "skip" questions; you must verify or reject all 10 to proceed.



- The system utilizes a **UAE-specific formulary**, featuring common regional brands (e.g., Julphar products, Tramal, Adol) and culturally relevant patient/prescriber names to simulate a local practice environment.

### The Dynamic Label Engine

The drug bottles you see are not images. They are code-generated 3D objects. This allows the system to:

- Randomize Lot Numbers and Expiration Dates instantly.
- Swap fonts to simulate "Look-Alike" labeling.
- Dynamically insert specific error data (e.g., changing a single digit in an NDC).

## 3. How to Play

### Step 1: Initialization

- Launch the application in any modern web browser (Chrome, Edge, Safari).
- Student Identity: Enter your Name and Student ID on the start screen. This data is used solely for the final printable report.
- Review the Pass Criteria (70% accuracy required per level).

### Step 2: The Verification Loop

Once the shift starts, you will see:

- **Left Panel (The Order):** The digitized prescription (**Doctor License & Signature**, Patient Profile, Sig, **Indication**, Qty, Refills).
- **Right Panel (The Product):** A 3D-rendered drug bottle.
- **The Timer:** A shrinking bar at the top representing the Service Level Agreement (SLA).

**Action:** Compare the Product against the Order. Look for discrepancies in Name, Strength, Form, NDC, Quantity, Refills, Expiration, or Clinical Safety.

### Step 3: Decision Making

- **VERIFY (Green):** Press `Right Arrow` or click "VERIFY" if the product is safe and correct.
- **REJECT (Red):** Press `Left Arrow` or click "REJECT" if there is any error.



**Note:** For every rejection, specific clinical or regulatory feedback is now provided (e.g., citing specific UAE Federal Laws regarding Narcotic refills).

#### **Step 4: Feedback & Progression**

- **Correct:** The bottle is swiped away, score increases, and the next order appears.
- **Incorrect:** The game pauses. A Preceptor Note modal appears explaining exactly why you were wrong (e.g., "Schedule II drugs cannot have refills").
- **Fatal Error:** If you verify a lethal order, the game ends immediately (See Section 4).

#### **4. Understanding the Assessment Levels**

The simulation is divided into 4 clearance levels:

##### **Level 1: Visual Accuracy (The Technician Check)**

- **Focus:** Can you read?
- **Challenges:** LASA (Look-Alike/Sound-Alike) names, Strength swaps (10mg vs 100mg), Dosage Form (Tab vs Cap), NDC mismatches.

##### **Level 2: Math & Law (The Resident Check)**

- **Focus:** Does the logic hold?
- **Challenges:** Expiration dates, Quantity calculations, **UAE Federal Law regarding Narcotic & Controlled Drug dispensing (e.g., Prohibition of refills on Narcotics).**

##### **Level 3: Clinical Safety (The Pharmacist Check)**

- **Focus:** Is it safe for this patient?
- **Challenges:** Drug-Allergy interactions (**e.g., Augmentin in Penicillin Allergy**), Indication Mismatches, Dosing Frequency appropriateness, and Narrow Therapeutic Index dosing.

##### **Level 4: Chaos Mode (The Chief Pharmacist)**



- **Focus:** Survival.
- **Challenges:** A random mix of ALL previous error types with a reduced timer (50% speed increase).

## 5. Troubleshooting

Issue	Possible Cause	Solution
"Print Detailed Report" button does nothing	The browser print dialog might be blocked or the report is hidden.	Use the "View Detailed Report" button first. This opens the report on-screen. Then click the "Print / Save PDF" button inside that view.
Bottle looks flat or text is missing	Browser hardware acceleration or CSS3 support is off.	Update your browser to the latest version. Ensure you are using Chrome, Edge, or Safari.
Game ends suddenly with "License Revoked"	You verified a "Fatal" error.	This is intended behavior. Certain errors (e.g., Daily Methotrexate, Known Allergy) cause immediate failure regardless of your "Lives" count.
Score Penalty (-200) applied	You failed a level (<70% accuracy).	The game allows you to "fail forward" to the next level, but applies a heavy score penalty to your final transcript.
Arrow keys not working	Focus is lost from the window.	Click anywhere on the game background to refocus the window, then try the keys again.

## 6. Glossary of Clinical Terms

- **LASA:** Look-Alike / Sound-Alike. Drugs with similar names that are often confused (e.g., *Hydralazine* vs *Hydroxyzine*).
- **NDC:** National Drug Code. A unique 3-segment number identifying the manufacturer, product, and package size.
- **Narcotic / Controlled / Semi-Controlled:** UAE regulatory classifications for drugs with abuse potential. Strict laws apply, including the prohibition of refills for Narcotics and Controlled items, and specific prescribing requirements
- **NTI:** Narrow Therapeutic Index. Drugs where small dose changes can cause toxicity (e.g., *Digoxin*, *Warfarin*).



## 7. Technical Specifications

- **Architecture:** Single-Page Application (SPA).
- **Language:** HTML5, CSS3 (Tailwind), Vanilla JavaScript (ES6).
- **Dependencies:** lucide-react (via CDN) for iconography.
- **Privacy:** 100% Client-Side. No student data, scores, or performance metrics are ever sent to a server. Data persists only in the browser's RAM during the session.
- **Concept & Logic:** Dr. Muhammad AlShorbagy, Dean, College of Pharmacy, GMU.
- **Technical Implementation:** AI-Assisted Development (Code generation).
- **Methodology:** "This simulation demonstrates a 'No-Code/Low-Code' development approach. The clinical logic, error matrices, and pedagogical progression were defined by Dr. Muhammad AlShorbagy and reviewed by Dr. Said Nabil (Lecturer) and Dr. Ruth Alex (Clinical preceptor) at Gulf Medical University, while the interactive engine and rendering code were generated via prompt engineering using Large Language Models (LLMs)."