

# Automating the Prescription Filling Process



## An Analysis of the Accuracy & Productivity of Automated Prescription Dispensing Systems

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## Executive Summary

The goal of this study is to determine the productivity and accuracy of automated prescription counting systems and their overall affect on the manual prescription filling processes in outpatient and retail pharmacy settings.

This study utilizes the standard observation based method of data collection and analysis and applies both personal observation and audio and video recording technology, over a period of five (5) days.

We also examine the size and physical layout of the pharmacy, the hours of operation, the number of staff, the inventory shelving units, the prescription collation process, the will call system and the utilization of any other workflow enhancing systems to determine how automation will impact each of these areas.

Finally, we review the activities of each staff member to determine if the pharmacists and the technicians adhere to any specific set of duties or responsibilities and if their duties change as a result of the automated prescription counting and workflow system. We also try to determine if the staff are being properly and efficiently utilized and observe how each person interacts with the technology and automation in each pharmacy.

## Pharmacy Layout

Each pharmacy (a total of five (5)) range in size from 550 square feet to 768 square feet and are divided into 4 sections (inventory, filling, Order entry/checking and will call/front end. A fair amount of travel was required, in all of the pharmacies that were observed, to complete nearly every task of the prescription filling process and it was especially noticeable during the morning hours when staffing is minimal.

The inventory shelving units were sufficient and accessible, in terms of available space and quantity, but most systems block the flow of traffic during prescription filling and inventory. They also provide numerous “dead” or “blind” spots from a variety of areas.

In an effort to prepare for the automated prescription counting and workflow system, and further boost efficiency, we would recommend some changes to the inventory shelving (see below) and the prescription filling and order entry counters.

## Utilization of Pharmacy Staff

It would appear that the pharmacists and the technicians have some specific job functions and that the prescription filling process flows in an organized and logical manner. The pharmacists generally handle the doctor calls, prescription checking and patient counseling and interaction, when requested, and the technicians handle the order entry, inventory and some of the prescription filling functions, however, that there is a fair amount of cross over by the pharmacist into the functions of prescription filling.

During the pre-installation data gathering phase it was observed that at certain times during the day (early morning and in the afternoon) that pharmacists would spend up to 55% of their time in the back of the pharmacy filling prescriptions, checking prescriptions and on the phone.

## Shelving and Inventory

It is recommended that each of the pharmacies consider some relocation and consolidation of the inventory shelving units.

Also consider a pathway in between the dispensing counters. We estimate that these simple changes could reduce unnecessary travel by as much as 60%.

## Will Call

We are pleased to see that the Monaco bag system is in use at each of the pharmacies, but modifications to the long will call counters could greatly reduce wasted space and enhance travel, access and workflow efficiency.

## Introduction

The purpose of this study is to review the accuracy and productivity of automated prescription counting systems in outpatient and retail pharmacies that fill 200 to 500 prescriptions per day.

## Goal and Objectives

This study utilizes a scientific approach for analyzing the accuracy and productivity of automated prescription counting systems, in outpatient and retail pharmacies, as compared to the manual method of counting and filling prescriptions.

The specific goals and objectives of this study are to:

1. Determine the accuracy and productivity of automated prescription counting systems.
2. Determine the efficiency of the pharmacy layout and configuration of the automated prescription counting systems.
3. Determine if the pharmacy staff is properly utilized with, before and after installing the automated prescription counting systems.

## Methodology

The specific techniques of the observation method in this study applied both video and audio taping and work sampling data analysis.

Work sampling is a data quantification technique, which is based on the laws of probability. A large number of the observations are made over a period of time to provide a pattern of the distribution of time spent in the work activities. The videotapes are then analyzed using the fixed-interval (1 minute) work sampling approach. Work sampling categories (see Appendix A) were developed and defined based on the activities observed in the videos.

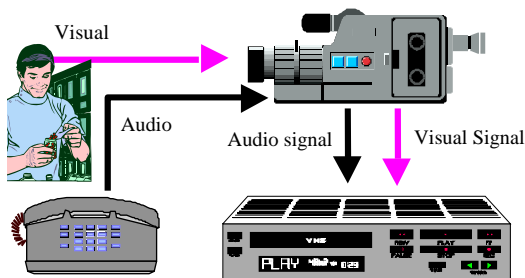
Work sampling and time study analysis are also applied to quantify the movement and operation of the pharmacy staff and the automated systems from the videotapes collected.

Graduate and undergraduate students from the University of Oklahoma (OU) and/or the University of Missouri at Kansas City (UMKC) are trained and employed for the data collection and analysis.

## Data Collection

For this study, approximately 350 hours of operation will have been recorded onto video tape before and after the automated prescription counting and workflow systems are installed in the pharmacy.

The video and audio taping process for data collection is depicted in [Figure 1](#). Camcorders were strategically located within the pharmacy.



[Figure 1 - Array of Equipment](#)

An example of video camcorder view is depicted in [Figure 2](#).



[Figure 2 - Example of Video camcorder View](#)

Designed to investigate and determine the effects of the automated prescription counting and workflow system, after it has been installed, this study utilized the following data collection protocol:

The five (5) weekday operation:

- Video and audio tape each designated pharmacy for 5 weekdays (Monday to Friday) before the automated prescription counting system is installed.
- Video and audio tape each designated pharmacy for 5 weekdays (Monday to Friday) after the automated prescription counting system is installed.

To secure the appropriateness of using videotaping approach in the pharmacy, the ThomsenGroup obtained permission for videotaping from each pharmacy and a HIPAA policies and procedures agreement has been signed and filed by both parties. And, since the visual and audio data that is recorded on the videotapes may contain sensitive or confidential information

between the patient and the pharmacy personnel, only the researchers are allowed to review the videotapes.

Upon completion of the data analysis from the tapes, the tapes are destroyed.

## Dispensing Area Images and Technology



Prescription filling counter and unit of use storage



Dispensing counter, storage area and robot



Prescription filling counter and storage



Front counter of pharmacy



Dispensing counter



Dispensing area and robot

# Observations and Findings for Manual Counting

## Manual Prescription Counting Accuracy Analysis

	Date	Total Count Prescribed	Actual Count	Count Accuracy
Pharmacy A	24-Oct-04	1212	1259	0.9627
Pharmacy B	9-Sep-04	918	956	0.9603
Pharmacy C	6-Apr-05	1057	1116	0.9471
Pharmacy D	4-Apr-05	1250	1301	0.9608
Pharmacy E	29-Jun-05	1047	1093	0.9579
<b>TOTAL COUNTS</b>		<b>5484</b>	<b>5725</b>	

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<b>Average Count Accuracy (%)</b>	<b>0.9579</b>
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# Observations and Findings for Automated Counting

## Parata Robot Speed & Count Accuracy Summary

	Date	Total Count Prescribed	Actual Count	Variation	Average Prescriptions per Hour
Monday	23-May-05	1015	1021	6	151.21
Tuesday	24-May-05	873	878	5	154.31
Wednesday	25-May-05	688	692	4	155.45
Thursday	26-May-05	768	771	3	149.88
Friday	27-May-05	667	671	4	152.67
<hr/>					
<b>TOTAL SAMPLES</b>					
	<b>TOTAL COUNTS</b>	4011	4033	22	
<hr/>					
	<b>Count Accuracy (%)</b>			99.45	

# Observations and Findings for Automated Counting (cont.)

## ScriptPro Robot Speed & Count Accuracy Summary

	Date	Total Count Prescribed	Actual Count	Variation	Average Prescriptions per Hour
Monday	7-Feb-05	1033	1045	12	107.45
Tuesday	8-Feb-05	967	972	5	111.67
Wednesday	9-Feb-05	998	1013	15	98.45
Thursday	10-Feb-05	676	721	45	105.21
Friday	11-Feb-05	1239	1244	5	98.88
<hr/>					
<b>TOTAL SAMPLES</b>					
<b>TOTAL COUNTS</b>		4913	4995	82	
<hr/>					
<b>Count Accuracy (%)</b>				98.36	

## Observations and Findings for Automated Counting (cont.)

### AutoMed Robot Speed & Count Accuracy Summary

	Date	Total Count Prescribed	Actual Count	Variation	Average Prescriptions per Hour
Monday	19-Apr-04	1232	1241	9	121.35
Tuesday	20-Apr-04	987	991	4	132.67
Wednesday	21-Apr-04	1022	1027	5	123.21
Thursday	22-Apr-04	899	911	12	119.07
Friday	23-Apr-04	798	802	4	124.56
<hr/>					
<b>TOTAL SAMPLES</b>					
<b>TOTAL COUNTS</b>		<b>4938</b>	<b>4972</b>	<b>34</b>	
<hr/>					
<b>Count Accuracy (%)</b>				<b>99.32</b>	

## Observations and Findings

During all hours of operation it was observed that a significant amount of travel was required in and around the counters in the prescription filling and order entry areas. The length of each counter, especially during the morning hours when staffing is minimal, requires that staff members navigate several obstacles to complete each part of the prescription filling task. And, because 35% to 55% of the prescriptions were being filled by the pharmacists, a great deal of travel is required when a pharmacist is needed to meet and/or speak with a patient.

It was also observed that frequent trips around counters were made to retrieve a prescription labels because of inappropriate location order entry counters.

The inventory shelving units, while sufficient in terms of space and quantity, block the flow of traffic during prescription filling and inventory. They also provide numerous “dead” or “blind” spots from a variety of areas.

In terms of job functions it does appear that the pharmacists and the technicians do have specific duties. Too often, however, it was observed that pharmacists perform a good amount of the prescription filling functions while also trying to check completed prescriptions, handle phone calls and interact with patients at the front counter, when requested.

In at least 4 of the 5 pharmacies we observed pharmacist filling up to 55% of the prescriptions. And, while the average prescription filling time is only 2.363 minutes, there were numerous occasions where a prescription took more than 4 minutes to fill because the pharmacist temporarily abandoned the prescription to perform other tasks.

Similar instances were also observed in the order entry area where some prescriptions could take more than 3 minutes to enter and complete because of interruptions and/or waiting for verification from a pharmacist.

We were pleased to see the Monaco bag system is in use, but there is a fair amount of wasted space along the front counters. Modifications to this fixture could greatly reduce wasted space and enhance travel, patient order access and workflow efficiency.

## Recommendations

Our first recommendation is that of applying the rules for an efficient and organized pharmacy layout.

The most important rule for pharmacy design and layout is to locate the inventory and prescription dispensing area in such a way that steps, to and from these areas, are minimized as much as possible.

In an effort to prepare for the automated prescription counting and workflow system, and further boost efficiency, we would recommend some changes to the inventory shelving and the 2 prescription filling and order entry counters.

Consider a pathway in between long dispensing counters and relocating (or adding another) the single pharmacy label printer. We estimate that these simple changes could reduce unnecessary travel by as much as 60%.



We also recommend that each pharmacy consider some relocation and consolidation of the inventory shelving units before the automated prescription counting and workflow systems are installed. Consider printing off a list of the top 200 dispensed drugs and locate them around or near the designated dispensing area and automated counting system. This simple step can reduce unnecessary travel by 50% to 80%.



In an effort to utilize the automated counting system at its maximum capacity assign one key person (most likely a technician) as the champion and caretaker of the system. An automated counting system is a valuable addition to the pharmacy and can provide real and measurable benefits, in terms of improved productivity and prescription filling capacity, but only if properly utilized and maintained.

Finally, look at the pharmacy shelving system and determine if it is limited to a single size shape or form of stock or if it is flexible and adjustable. Consider other types of shelving systems that allow for quick and simple relocations and your pharmacy changes and expands.

## Appendix A

### **Work Sampling Categories**

#### **Classification and Descriptions of Work Activities**

### **Prescription processing activities**

#### **A. Receiving**

1. Patient-in prescription(s)[script(s)][*new/refill*]
  - Greet patient and receive script(s)
  - Ask patient to show his/ her insurance card [*new*]
  - Review script(s) for readability or missing information [*new*]
  - Ask patient to provide complete required information [*new*]
  - Travel to the order entry counter
  - Place new script order(s) into bin and refill script order(s) into bin for differentiation\*
2. Phone-in script(s) from medical doctor (M.D.) office [*new*]
  - Transcribe script order(s)
  - Place order(s) into bin by patient
  - Travel to place to-be-entered bin(s) on order entry counter
3. Phone-in script(s) from patient [*refill*]
  - Check voice mail messages
  - Record call-in date, patient name, phone number, script number, and pick up date
  - Place order(s) into bin by patient
  - Travel to place to-be-entered bin(s) on order entry counter

#### **B. Order entry**

- Retrieve order from to-be-entered bin [*new*]
- Code script [*new*]
- Establish patient profile [*new*]
- Review patient profile [*refill*]
- Enter physician's order into computer system
- Examine drug regimen of a patient

- Conduct Medication Use Evaluation
- Remove bar code from printer and adhere to original script (with automated workflow system)
- Scan original script (with automated workflow system)

## **C. Filling**

### **1. Staging**

- Print out script label
- Obtain label from printer
- Place order(s) and script label(s) into bin by patient
- Move completed bin to the filling area

### **2. Manual**

- Retrieve script label(s) from to-be-filled bin
- Review script label(s)
- Travel to drug storage shelves
- Obtain drug(s)
- Travel back to filling counter
- Use counting tray or an automated system to count oral solids
- Discard empty drug bottle
- Obtain vial, pour medication into vial, and cap it
- Change oral liquid bottle with secured cap if needed
- Record drug lot number and expiration date on sticker
- Attach the label to filled vial or unit-of-use container
- Place drug bottle(s), filled vial(s), and script label(s) into green/red bin by patient
- Travel to place to-be-checked bin(s) on inspection counter

### **3. Automated**

- Retrieve script label(s) from bin (automatically labeled on robotics)
- Review script label(s)
- Select vial according to size noted on monitor (automatically selected on robotics)
- Label vial (automatically labeled on robotics)
- Scan bar code on vial (after filling on robotics)
- Dispense script from correct chute on the automated system directly into the labeled vial or retrieve filled and labeled vial from robot
- Cap filled vial
- Gather the receipts and filled vial(s) into bin by patient
- Move completed scripts and bin to the inspection area

## **D. Inspection and verification**

### 1. Manual

- Retrieve drug bottle(s), filled vial(s), order(s), and script label(s) from to-be-checked bin
- Proofread labels one by one, including name, strength, dosage form, and quantity of the drug.
- Inspect and verify medication appearance (size, shape, and color), expiration, *etc*
- Review patient profile as needed
- Attach auxiliary label(s) to vial or container
- Waterproof labels on vial or container
- Correct the problem by repeating appropriate steps if there is a problem
- Sign inspection log after verification
- Attach log sticker on order [*new*] or inspection book [*refill*]
- Place checked script order in script organizer or drop script into file box [*new*]
- Tear off label backing from script label
- Discarding label backing and keep receipt and information forms
- Group filled script(s), receipt and information forms into to-be-packed bin by patient
- Travel to place to-be-packed bin(s) on packaging counter

### 2. Automated

- Retrieve filled vial(s) from to-be-packed bin
- Scan bar code identification label one by one
- Inspect and verify medication appearance, expiration, *etc*
- Review patient profile as needed
- Attach auxiliary label(s) to vial or container
- Waterproof label on vial
- Correct the problem by repeating appropriate steps if there is a problem
- Group filled script(s) and place into bag
- Attach receipt and information forms and then staple
- Move bag to will call counter

## **E. Packaging and storing**

### 1. Manual

- Retrieve completed prescription bags from will call counter
- Store prescription bags in plastic totes by first letter of patient surname

### 2. Automated

- Retrieve completed prescription bags from will call counter
- Scan bar code on prescription label and designated storage location
- Store prescription bags in hanging plastic bags (Monaco) by first letter of patient surname

## **F. Dispensing and billing**

### 1. Manual

- Page patient *[new]*
- Greet patient and ask patient name *[refill]*
- Travel to obtain prescription from storage bin *[refill]*
- Retrieve filled script(s) from bag
- Check filled items with patients
- Ask the patient if there is any question for counseling
  - If yes, page a Pharmacist to answer patient's question
  - If no or after pharmacist's counseling, ask patient to sign on third-party log
- Wait for patient's signature
- Place medication in bag
- Hand packed medication to patient
- Receive co-pay and see patient off

### 2. Automated

- Page patient *[new]*
- Greet patient and ask patient name *[refill]*
- Travel to automated system monitor and lookup patient name
- Obtain prescription location from automated workflow system
- Obtain prescription from will call or automated will call system *[refill]*
- Retrieve filled script(s) from bag
- Check filled items with patients
- Ask the patient if there is any question for counseling
  - If yes, page a Pharmacist to answer patient's question
  - If no or after pharmacist's counseling, ask patient to sign on third-party log
- Wait for patient's signature
- Place medication in bag
- Hand packed medication to patient
- Receive co-pay and see patient off

## **Problem-solving activities**

### **A. Patient- or script-related problem solving**

- Deal with the patient who is not qualified for filling script due to his/ her script or insurance problem
- Establish non-formulary drug profile as needed
- Take corrective actions if script label is incorrect
- Refill incorrect order as needed
- Deal with computer problems
- Handle exceptional case

### **B. Telephone follow-up**

#### 1. Script-related

- Call MD office to obtain proper interpretation of order as needed
- Call for physician's refill authorization as needed
- Answer phone call regarding refill authorization from MD office
- Call and inform patient if refill is not authorized
- Recommend different drug use

#### 2. Insurance-related

- Call insurance company to verify patient's insurance status

### **C. Patient counseling**

- Provide basic clinical information
- Review patient profile
- Answer question(s) about script or drug information

## **Inventory maintenance**

### **A. Inventory ordering**

- Record out-of-stock item on order list
- Send inventory order to wholesaler or dealer

### **B. Inventory stocking**

- Refill stock on drug storage shelf
- Return remaining unused drugs back to storage shelves

- Restock returned medications
- Load drugs in dispensing cells

### **C. Other inventory control activities**

- Receive new-coming drug totes from wholesalers or dealers
- Process returned medications
- Monitor remaining inventory
- Remove expired and recalled medications
- Other

## **Personal/Idle time**

### **A. Lunch and break**

- 30-minute lunch
- 15-minute break

### **B. Idle time**

- Wait to perform a pharmacy task

### **C. Other non-work-relative activities**

- Early departures or late arrivals
- Personal telephone calls
- Chat with consumers, patients, or other pharmacy staff
- Restroom
- Other

## **Miscellaneous Activities**

### **A. Management**

- File medication orders
- Input error inspection
- Run reports
- Other

### **B. Retail service**

- Sell non-script products
- Manage retail inventory
- Counsel over-the-counter product(s)

### **C. Cash register**

- Close cash register
- Complete cash deposit
- Exchange small change

### **D. Automated counting system maintenance (optional)**

- Warm up system
- Test system
- Prepare and perform maintenance
- Load vials to dispensers
- Change printer ribbons and labels

### **E. Pre-packaging**

- Get drugs and prepackage oral solid medications as needed

### **F. Customer relations**

- Conversation with the patient or customer

### **G. Travel\*\***

- Travel to next workstation when the previous activity is finished and the next activity has not started yet
- For example, the pharmacy staff moves from the filling station to the dispensing windows to answer patient requests.

### **H. Unobservable**

- Any activities beyond observation
- Absent

### **I. Other work-related activities**

- Cleaning of the automated counting systems
- Clean work counter
- Organize work area

- Provide drug information when questioned
- Attend scheduled meetings or educational seminars
- Other

**\*\* Travel within the work area is often difficult to assign to a specific task classification. The researcher will make a judgmental assignment of these observations based on pre and post function of work.**