

## Accredited Home Study Program Available

The Efficient Pharmacy Institute is pleased to offer pharmacists an accredited independent learning program (home study) that will provide pharmacists with an understanding of the methods and tools available to improve productivity in their dispensary operations. Specifically, pharmacists will learn to:

- detect inefficiencies in dispensing operations
- identify the types of improvements (layout and technology) that can be made to improve cost-effectiveness and efficiency
- recognize some of the causes of prescription errors due to operating inefficiencies, improper layout or workflow
- distinguish ways to improve patient access and communications

The home study program will be offered as a series and will cover a breadth of topics relating to improving efficiency. Topics will include an overview of new and emerging technology (automation for prescription filling, information systems - POS, IVR, etc.) and design and layout (workflow patterns such as, layout, job analysis/description, ergonomic factors, etc.)

For more information on the availability of the program please contact:

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# Improving efficiencies and reducing medication errors

## Part 2: Product placement

by Wayne M. Caverly

As prescription volumes grow, pharmacists will be forced to fill more prescriptions in less time (see Population Growth, page 3). Various issues affect accuracy, output, productivity, and efficiency. In the preceding issue of *The Efficient Pharmacy*, we discussed staffing and automation. In this issue, we look at another important factor: product placement in the dispensary.

There are several ways to arrange medications: alphabetically by product, alphabetically by manufacturer, in groups according to therapeutic action, or ranked by prescription volume.

### Alphabetic mapping

Products are typically organized on shelves in alphabetic order. This causes problems, however, because many containers of different medications have similar structural characteristics. A number of drugs also look alike and have similarly-pronounced names or share similar letter sequences in their spelling. Arranging items alphabetically might make them easier to find and restock, but it can lead to dispensing errors.

One study found that mistakes in preparation and processing of prescriptions account for 86% of U.S. pharmacist malpractice claims, with 79% of those mistakes due to the wrong drug or the wrong strength being dispensed. Another study showed wrong-drug or wrong-strength dispensing accounting for 88% of errors. In one case, pharmacy staff picked

Xanax instead of generic atenolol because of identical packages misplaced on the stock shelf.

Alphabetic storage can also turn product retrieval into a marathon. Imagine yourself in your pharmacy, busy filling the day's orders—say, 150 prescriptions. For each one you walk from your work counter to the stock shelves, pick the product, and return to the work counter to count out the medication. Then you repeat the process to reshelve the container. At the end of the day, you've typically walked more than two kilometres (1.5 miles) to fill those 150 prescriptions!

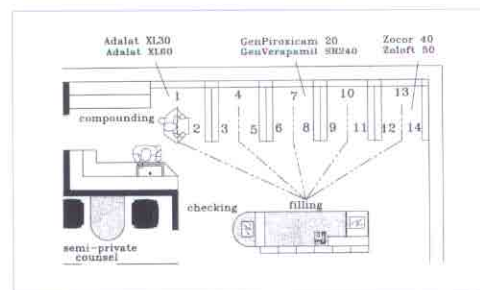


Figure 1: Typical alphabetic layout

This figure is derived from an AutoPharm study — Pharmacy Productivity Analysis-of an Ontario community pharmacy. Figure 1 shows the layout, with products shelved alphabetically. Note that, in our study pharmacy, Adalat XL 30 mg is next to Adalat XL 60 mg on shelf 1 to the far left of the dispensary, while the generic heart drugs piroxicam 20 mg and

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## Robots for Community Pharmacy

Pharmacy automation has come a long way since the late 1960s when a few countertop “universals” and the now well-known Baker Cells were introduced. Automation was at first affordable for the highest-volume stores only, but we now see automation of all levels of complexity and price, so that any pharmacy can find affordable help.

In this issue of “Technology Watch” we’ll introduce you to what’s currently available to fully automate traditional (bulk-to-vial) prescription filling. These robotic systems all perform the tasks necessary to take the prescription from data entry to the point of pharmacist verification.

The first fully robotic counting system appeared in 1990 when AutoScript II was installed in the American Association of Retired Persons (AARP) mail-order pharmacy in Reno, Nevada. In the mid-1990s the faster BK2000 and BK6000 systems followed, with the ability to process 2000 and 6000 prescriptions, respectively, in an eight-hour shift.

The newest generation of robotic systems was released in the mid-1990s and includes ScriptPro and AutoScript III. What these systems have in common is procedure: they choose a vial (one of multiple sizes), count the required product, label the vial, place the counted product in the vial, and deliver the filled, labelled vial to the checking pharmacist. They are also similar in that each Windows-NT-based system uses bar code verification during filling to ensure that the proper product is placed in the cassettes. Where they differ is in their method and speed of dispensing and in the way they handle restocking.

The ScriptPro 200 machine is a linear unit that holds 200 user-calibrated medication cassettes. A robotic arm chooses a vial and transports it to the proper medication cassette. It then waits while the system counts the product into the vial. Once the count is completed, the vial is transported to the verification sta-

tion where a pharmacist can compare the actual medication dispensed with a reference image on a computer screen. Because the arm is single-tasking (performs only one task at a time), and the count is only one to two per second, the SP200 is often too slow during busy periods or at high volumes. Also, whenever a product cassette runs empty, the entire system must be shut down and opened for refilling.

The Baker AutoScript III is a multi-tasking, fully articulated robotic arm. In plain English, it’s able to do two things at once (count the product while choosing and labelling the vial) and is able to move and reach in any direction. In 36 square feet, AutoScript III provides 145 factory-calibrated Baker cassettes to count medication at a rate of 10 tablets or capsules per sec-

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### Comparing ScriptPro and AutoScript III

	Count size (tab. or cap.)	Process speed (A) in seconds	Add’nl count time (B) in seconds	Total process time (sec.)
ScriptPro	30	44	29/2 = 14.5	58.5
AutoScript III	30	33	—	33.0
ScriptPro	60	44	59/2 = 29.5	73.5
AutoScript III	60	33	—	33.0
ScriptPro	90	44	89/2 = 44.5	88.5
AutoScript III	90	33	—	33.0
ScriptPro	120	44	119/2 = 59.5	103.5
AutoScript III	120	33	30/10 = 3	36.0
ScriptPro	200	44	199/2 = 99.5	143.5
AutoScript III	200	33	110/10 = 11	44.0

A: Process speed: the time that it takes to complete a cycle. One cycle includes one tablet or capsule on ScriptPro and 90 tablets or capsules on AutoScript III. The reason for this discrepancy is that AutoScript III is a multi-tasking system while ScriptPro is single-tasking.

B: Additional count time (count speed): the time that it takes to count additional tablets or capsules. ScriptPro counts two per second (120/minute); AutoScript III counts 10 per second (600/minute).

By applying these metrics to actual dispensing data from a 400-prescription-per-day pharmacy, the following results are obtained:

- ScriptPro takes 2,488 hours to process the year’s 104,000 prescriptions for an average process time of 85.94 seconds per prescription.
- AutoScript III takes 993 hours to process the same 104,000 prescriptions (accounted for by the top 145 countable products) for an average process time of 34.29 seconds per prescription.
- The additional 1,495 hours taken by ScriptPro is equivalent to 37 (40-hour) workweeks.

An adjustment should be made to reflect the fact that ScriptPro can handle up to 200 products versus AutoScript III (A series), which handles 145 products. The additional 55 high-volume products account for another 11,718 prescriptions, which ScriptPro counts in 306 hours.

If you assume that the average time to complete a countable prescription manually is 90 seconds:<sup>1</sup>

- ScriptPro, with an average process time of 85.94 seconds, saves 4.06 seconds per prescription (130.5 hours per year).
- AutoScript III, with an average process time of 34.29 seconds, saves 55.71 seconds per prescription (1,609.4 hours per year).
- AutoScript III provides 1,233% more timesaving than ScriptPro.



# Profile

## Pharmasave #546 Middleton, Nova Scotia

Sandy Penny, Head Pharmacist at Pharmasave in Middleton, Nova Scotia, says, "One of our first considerations in designing our new dispensary was to create a workspace in which we were not tripping over each other. We occupied our old location for over 10 years and it no longer served our needs. Our previous pharmacy was about 4,400 square feet. Not only was it too small, but the original design concept was done in the 70s. The dispensary had an elevated platform with a very long barrier-type counter. With three or more pharmacy staff working in the dispensary at one time, we were always walking into each other."

Rob Perry, owner of the Pharmasave, purchased three buildings on an L-shaped lot across the street from his existing pharmacy. He demolished the buildings and re-constructed a brand new 7,400-square-foot

store. The new space was divided into 692-square-foot dispensary, a 1,800-square-foot home health care area and the balance was the front-end store. "One of our growth areas was home health care products. We have a nurse on staff and we needed additional space for displaying products and for consultation," says Penny.

The design of the pharmacy was to some degree dictated by the shape of the lot. There is a rear entrance; the dispensary is located at the rear in the centre; and the home health-care area is to the left.

"Our new dispensary had to accommodate up to five pharmacy staff at any time — two pharmacists and three technicians. We also wanted to reduce unnecessary walking." The new design incorporates a reception and data-entry area. Prescription requests are entered into the computer and a label is produced.

Right behind the data entry is an island in which the label is passed through to the technician who in turn fills the prescription.

"We installed bay shelving at the rear of the dispensary. This type of shelving is far more workable. We can adjust the shelving to accommodate different sizes of stock bottles and medications." In front of each of the three bay shelves, Penny installed a 3-tiered automation system.

"For our highest-volume products we installed 23 Baker Cells, for the next top 50 products we have a vacuum dispenser or Drug-O-Matic Counter, and for the lower-volume medications we have a counter-top counter or Universal counter. After completing an analysis of our volume, BakerAPS was able to recommend the different levels of automation that would be most efficient for our operation."

The Baker Cells is the most automated system. The next level of automation, the Drug-O-Matic, has three sizes of product cassettes, which are placed, one at a time, on a vacuum-powered counting machine. The vacuum sucks the tablets or capsules onto holes in the back of the cassettes, then releases them by stopping the suction once they have passed a photoelectric eye.

The Universal counter operates by scanning the UPC bar code on stock bottles. The weight of each oral-solid is retrieved from the

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## Population Growth: The Impact on Pharmacies

The population of Canada in 2001 will be 31.9 million and 21% or 7.0 million will be 55 years and older. By 2016, the 55 years and older segment is expected to account for more than 24% of the population. Currently with just over 7,000 pharmacies, the average pharmacy serves about 4,500 people annually, of which 1000 are 55 years and older and although this group represents 22% of the population, it accounts for about 40% of the prescription volume. In order to maintain the same volume of workload per pharmacy, another 1,200 pharmacies have to be opened in the next 15 years. However, because of the pharmacists shortage, this sce-

nario may no longer be feasible. The scarcity of pharmacists is bound to be exacerbated with the increasing workloads - filling more prescriptions in less time. How do we solve the problem? One solution is to increase the level of automation in the dispensary, in this

way, more prescriptions can be filled using less or the current levels of pharmacy staff. Automation has not only demonstrated that it can reduce workload and stress level, but it can fill prescriptions with greater accuracy.

### Impact of Growing Population

#### Projected impact if the number of pharmacies remains constant

Year	Population	Pop. 55+	% at 55	No. Pharmacies	Average/Pharmacy	55+/Pharmacy
1996	29,969,100	6,017,300	20.08%	6,101	4,912	986
2001	31,877,300	6,983,000	21.91%		5,225	1,145
2016	33,675,005	8,128,300	24.14%		5,520	1,332

#### Required number of pharmacies to serve 55+ population

Year	Population	Pop. 55+	% at 55	No. Pharmacies	55+/Pharmacy
1996	29,969,100	6,017,300	20.08%	6,101	986
2001	31,877,300	6,983,000	21.91%	7,082	
2016	33,675,005	8,128,300	24.14%	8,244	



## Robots for Retail — Continued

ond. When a cassette is getting low on stock, AutoScript III delivers it to a refilling station and continues to fill prescriptions while the cassette is replenished. AutoScript III is ordered with Pharmacy 2000 software, which allows for on-screen product verification at the end of the process. In addition to providing an image of all counted products within the pharmacy (not just the 145 products in the robot's cassettes) Pharmacy 2000 provides an image of the doctor's original prescription for all refills. Because it is multi-tasking and counts at such a high speed, AutoScript III can dispense more than two prescriptions per minute. More important, count size — the bane of slower machines — does not have a significant impact on this system.

As good as robots are, they are only one piece of the dispensing process. It must be kept in mind that the timesaving provided by these systems is primarily in technician time. Robots are therefore best used as an automated part of a total productivity solution.

### Reference

1. "Pharmacy Activity Cost and Productivity Study," Arthur Andersen, LLP. Funding support provided by the National Association of Chain Drug Stores Education Foundation, Nov. 1999 [www.nacds.org](http://www.nacds.org)

## The Efficient Pharmacy

Trends in Dispensary Organization & Automation

*The Efficient Pharmacy* is a quarterly newsletter that addresses the informational needs of community pharmacists as they adjust to a changing pharmaceutical environment. The publication will provide pharmacists with timely practical information on how to reprofessionalize their pharmacy by improving work flow, adopting new technology and developing the ergonomic design of the dispensary and its components. *The Efficient Pharmacy* is distributed free of charge to pharmacists in Canada and is funded by an educational grant from AutoPharm.

The opinions expressed in *The Efficient Pharmacy* are those of the contributors and do not necessarily reflect the views of AutoPharm.

The editorial staff and AutoPharm welcome opinions as well as subscription requests from our readers. Please direct your correspondence to:

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## Profile — Continued

product's database and transferred to the balance portion of the machine.

"After the prescription is filled it's transferred to the checking station where the pharmacist on duty verifies the prescription visually and by the computer. We have located the semi-private counselling area next to the cash. Our private counselling area is beside the semi-private, and while it's not used daily, we found it's very convenient at times."

Penny has found that the home health-care products and services has been one the fastest growing areas of their pharmacy. "The growth, I believe, has come as a spill-over from our prescription business. It's all about providing a continuum of care, and customers have come to expect that from pharmacies." The new area for home health care is accessible, but private. There is ample room for all products such as crutches, canes, glucose monitors, wheelchairs, and for consultation on compression therapy, orthodontics, prosthesis fittings and foot care.

After moving in April 2000, Penny says she is very satisfied with the results. "Now when there is only one pharmacist on staff, about 30-40% of the time, using the three levels of automation, we can still fill the same volume of prescriptions without the stress and less personnel."

## Improving Efficiencies — Continued

verapamil SR 240 mg are on shelf 8, behind the main work area. The high-volume product (Adalat XL 30 mg) is stored almost five metres (15 feet) from the dispensing area while two low-volume products are within two metres (6 feet) of the work counter.

### Prescription mapping

Now imagine the dispensary re-mapped to store products based on the number of prescriptions filled, as in figure 2. The most important benefit is that easily-mistaken drugs are not stored close to each other. This minimizes wrong-drug or wrong-strength filling errors.

This prescription-mapping arrangement (discussed in detail by Carole Beaudet in *The Effi-*

*cient Pharmacy* Vol. 1 No.4) also reduces walking and, therefore, the time that it takes to fill prescriptions. Using our example above: Instead of walking nearly 20 metres (60 ft.) to retrieve and then return the container of Adalat XL 30 mg, you walk less than nine metres (27 ft.). Over the year, that adds up to almost 2 kilometres saved for just one strength of just one product.

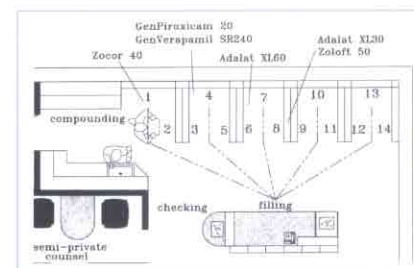


Figure 2: Layout according to frequency of use

## Advantages and disadvantages

The frequency-of-use layout requires software — such as Baker APS's Pharmacy 1000, which includes a full dispensary-mapping feature — to direct technicians to the correct locations, but this software is readily available and provides ancillary benefits. For a review of this type of software, refer to *The Efficient Pharmacy* Vol. 1 No. 2, pharmacy software.

It is a given that rearranging all the stock in your dispensary will take time, and you will need some time to adapt your procedures to the new method. You will also need the computer or a printout for restocking your shelves. Despite all this, you will very quickly gain the advantage of time: more time to spend with your patients and customers and more time for other tasks. Service will be faster. And the ultimate benefit will be enormous reductions in dispensing errors.

In our next installment, we'll cover how prescription-checking, design, and environmental considerations can also impact dispensing errors.