Outpatient Pharmacy Layout
Out-Cycling and Time-to-Delivery

"Envision and Think In Terms of the Future State"
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Engineered drug chain production channel rates belie the long wait lines and delays consumers often experience. If you are asking yourself why your counter is not working as well as the drug chains, it is because the chain drug counter really does not work well for the patient either.

Overview

- Outpatient pharmacy prescription fulfillment process must be significantly smaller than retail owing to the small window of opportunity and market intolerance for delays.
- Conversion cycle severability offers hospitals the opportunity to redistribute cycle time and reduce the time-to-delivery.
- Processes can be wholly or partially distributed, and can affect all or select product production channels.
- All stakeholders must be willing participants in the redistribution of pharmacy process.

This article introduces concepts which will be applied in future articles, out-cycling and time-to-delivery. In an earlier article, we covered channel disruption caused by leakage, interrupts, and traps. These, in part, account for why actual output rates differ greatly from engineered rates. Today's discussion begins with a high integrity conversion cycle.

By now the message should be clear. The highly engineered retail channel rates are not enough to satisfy hospital markets. Ample evidence of this exists where hospitals outsource their pharmacy to chains or other pharmacy management companies who depend on inelastic demand queues when output rate falls short of input rate. There is little advantage to in-hospital drug chains to build-out an efficient and effective, patient centric prescription delivery system. A client that out-sourced the pharmacy to a management company to reduce losses found they had paid high bonus fees for what amounted to simply reducing the number of served patients.

Hospitals must fill prescriptions on the market's terms to be successful. Queuing theory tells us that when arrivals exceed serviceability wait lines grow until arrivals fall below the serviceability rate. The practical end for outpatient pharmacies, however, occurs much quicker as potential consumers balk and those in the system renege. The solution to keeping patients from walking away has always been to add staff. Unfortunately, adding staff feels like giving back payroll that has already been harvested to reduce losses or increase profit

somewhere in the past. That is a hard sell for all kinds of reasons.

Staff-to-demand must couple with demand management for it

Illustration 1
SCRIP CONVERSION CYCLE

to work in our future state. The key to the latter is the severability of the scrip conversion cycle shown in Illustration 2.

This simplification of the fulfillment process divides the cycle into discreet processes that in-turn divide into severable sub-processes.

We have limited options for changing the conversion cycle, but we can manage *when* demand occurs. We will divide the conversion cycle into *in-cycle* (time-to-delivery) and *out-cycle* processes to help clarify the changes we make. Demand management will take place in two steps. First, we will move some in-cycle processes to out-cycle. Second, apply technology to the remaining in-cycle processes to further reduce time-to-delivery.

It bears repeating often that process changes that extend the conversion cycle outside the four walls of the pharmacy need to seamlessly integrate with other hospital operations. The goal is to avoid adverse floor and administrative disruption. Doctors, nurses, staff, and administrators must understand and willingly participate in the process. Changes that are perceived to extend the value of their practice and/or contribute to floor goals have the best chance of success. You must make sure all stakeholders participate in the out-cycling effort.

Out-cycling Processes

Out-cycling is redistributing and moving in-cycle process time to increase time available for servicing residual[1] counter demand. The goal of out-cycling is to remove all processes not essential to the conversion of drug stock[2] to deliverable product. Illustration 3 compares the traditional conversion cycle (in blue) with one that out-cycles non-essential processes. As we move *time* out of the in-cycle, we begin to shrink time-to-delivery and increase the number of patients serviceable at the counter in the window-of-opportunity.

We approach out-cycling in two steps. Illustration 3 divides the conversion cycle into two functional groups. Patient engagement includes all processes dependent on and derivative of the patient encounter. This includes the traditional processes of data entry, data review, DUR, issue resolution, payment, etc. The production group includes only those processes not essential to the *real-time* conversion of drug stock to product.

Illustration 3
OUT-CYCLING GROUPS

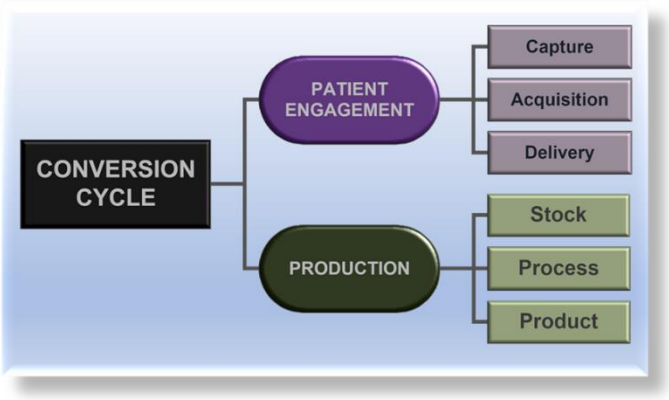
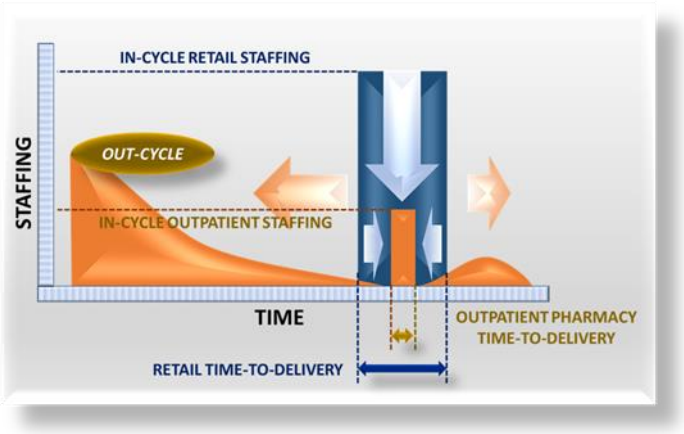


Illustration 4 suggests redistributing time the furthest away from the window of opportunity as practicable. Capture, for example, can begin before the patient enters the hospital. Acquisition, on the other hand, can only occur after a doctor *decides* on drug therapy. When we address the production function, we will use pre-acquisition to out-cycle elements of production.

A process can be wholly or partially out-cycled. Patient engagement record set-up and order entry are examples of processes that can be fully out-cycled. Order entry can also be partially out-cycled in the absence of EMR support.

Illustration 4
TIME-TO-DELIVERY



Out-cycling Production

Redistributing patient engagement processes will not reduce in-cycle time enough to service the counter window of opportunity. It is important to keep in mind that *perception*[3] drives consumers. It does not matter how short *you believe* the time-to-delivery is, only what the patient believes or feels. The clock begins the moment they enter the counter queue.

There are out-cycling opportunities for the production function of your conversion cycle. In combination with layout, fixtures, and equipment these out-cycled elements of the production function help to reduce time-for-delivery for product segments. It is important to think of the conversion cycle as comprised of product specific production channels.

Each production channel in the conversion cycle can be tuned by out-cycling processes that are not dependent on a prescription order. We make use of *virtual* demand to allow the pharmacy to complete elements of the conversion cycle before *actual* demand occurs. WIP (work-in-process) is a production management tool that shortens a manufacturer's order-to-delivery time. For example, if three versions of the same product use the same motor, manufacturers prefabricate motors for use at each of the three production channels. Similarly, if all three versions use the same motor/switch combination, then manufacturers will add the switch to the motors and place the partially assembled unit into WIP inventory.

Hospital EMR systems contain prescribing data that allow pharmacies to anticipate demand and *pre-fab* WIP inventory with a high degree of confidence. Only, in this case, the time-to-delivery process is reduced to labeling, verification, and delivery. WIP inventory should not exceed the supply anticipated before the start of the next regularly scheduled pre-fab cycle. For example, if the pre-fab production channel is scheduled for once a week, WIP inventory should be limited[4] to 1 standard deviation of expected weekly demand.

Another way to create *ready-product* and lower time-to-delivery is *bundling*. Certain medical procedures require the same drug therapy making it possible to bundle drugs for delivery. Doctor prescribing patterns may also be a data source for possible bundling. Pre-fab can be coupled with bundling for additional time-to-delivery reduction opportunities.

Every second counts. The difference between serving a patient and losing that opportunity in a hospital can be a matter of seconds or minutes. A lost opportunity not only puts therapeutic outcome at risk. It also affects future patient capture opportunities as discharges communicate their disappointment or negative experience to secondary and tertiary markets.

How much time must be out-cycled?

We want our outpatient pharmacy solution to be *the* disruptive force, and if not, able to thrive in whatever format the future state of prescription delivery assumes. Pharmacy will look very different in the future and our solution must consider that disruption. Short of solutions that eliminate the need for drugs, let us consider immediately handing a patient their medication when prescribed or otherwise authorized as a possible future state. Such a future state sets the stage for disrupting drug retailing and creates a framework for eliminating PBMs.

The answer to how much time must be out-cycled has less to do with mathematics than patient *expectation* and *ability*. It is important to remember that patients are consumers first. A manager revealed during a meeting that she had an amazing experience at a competing drug chain. Another manager (a pharmacist) responded insisting she did *not* have a good experience. Who was right? Of course they both were, but only one chain succeeded in making the consumer happy. Getting the math right might make you right but it will not necessarily make you a success.

Illustration 5
DELIVERY MATRIX

The goal for out-cycling time is to capture 100% of the hospital market by delivering prescriptions within the window of opportunity, or sooner. We couch our cycle expectations in terms of how the patient (consumer) *perceives* time in order to accomplish this. This is certainly not to dismiss the importance of a 3-4 minute time-to-delivery, but that this is not enough to hang our hat on. Patient wait time tolerance, for example, may be 5 minutes … regardless of the number of scrips being filled … and as a wise president once told me, " … what makes you think anyone cares 'why'?".

We couple our in-cycle time to other time-to-delivery agents to meet or exceed patient expectations. One such agent is the *delivery matrix*. The delivery matrix creates additional windows of opportunity by pushing finished product to patient location or traffic. Illustration 5 shows a sample matrix which focuses on bedside service as a key delivery agent. This changes the pharmacy counter from the *only* to the ***last*** window of opportunity. We will talk about changing the *perception* of time by introducing other agents in a future article.

Illustration 6 offers a simple example of how the bedside service changes based on the average in-cycle conversion rate (Mins P/Rx *within each 15-minute cycle period*) and the number of staff available to service demand. In this example we assume 175 scrips over a 2-hour discharge window. Internet sources suggest drug chains expect pharmacists to deliver prescriptions within 10-15 minutes.[5] Even though most of us experience wait times longer than this, the table in Illustration 6 uses this range as the *current state*.

While pharmacy benefits from bedside delivery service, a *dependency* on high penetration is risky. The table in Illustration 6 offers reference for how bedside service dependency drops as we reduce the period minutes per scrip and increase service capacity.

Illustration 6
CALCULATING BEDSIDE SERVICE REQUIREMENT

Mins Per Scrip	Number of Servers									
	1	2	3	4	5	6	7	8	9	10
4	83.0	65.9	48.9	31.8	14.8					
5	86.4	72.7	59.1	45.5	31.8	18.2	4.5			
6	88.6	77.3	65.9	54.5	43.2	31.8	20.5	9.1		
7	90.3	80.5	70.8	61.0	51.3	41.6	31.8	22.1	12.3	2.6
8	91.5	83.0	74.4	65.9	57.4	48.9	40.3	31.8	23.3	14.8
9	92.4	84.8	77.3	69.7	62.1	54.5	47.0	39.4	31.8	24.2
10	93.2	86.4	79.5	72.7	65.9	59.1	52.3	45.5	38.6	31.8
11	93.8	87.6	81.4	75.2	69.0	62.8	56.6	50.4	44.2	38.0
12	94.3	88.6	83.0	77.3	71.6	65.9	60.2	54.5	48.9	43.2
13	94.8	89.5	84.3	79.0	73.8	68.5	63.3	58.0	52.8	47.6
14	95.1	90.3	85.4	80.5	75.6	70.8	65.9	61.0	56.2	51.3
15	95.5	90.9	86.4	81.8	77.3	72.7	68.2	63.6	59.1	54.5

Not all hospital markets are suitable for bedside delivery. This creates a ceiling for bedside potential. Hospitals must use adjusted bedside potential (total less patients who cannot be served bedside) to measure dependency and ensure that bedside goals are achievable.

CCR and Scrip Equivalents

Before we can go any further, we need to address the elephant in the room … *not all scrips are equal*. The controlled substance production channel has a low output rate because of regulations, security measures, and record keeping. In contrast, a scrip for eye drops flows quickly through its production channel. What do we need in the future state to make Illustration 6 work for all prescriptions? The answer is the *scrip equivalent.*

A scrip equivalent compares the time of a production channel[6] to the average production channel time for a normal prescription. Let's say our normal medication channel (pill bulk-to-vial) outputs a finished product every 4 minutes. The C-II production channel only outputs at a rate of 1 every 10 minutes. The C-II production channel would have a scrip equivalent of 2.5:1 and each C-II prescription would be counted as 2.5 prescriptions for calculating service demand.

We can calculate a scrip equivalent for any pharmacy task or event. For example, we can create scrip equivalents for technician and pharmacist tasks separately (preferred). We can also create scrip equivalents for patient engagement time. For example, if one hospital market requires more pharmacist or technician engagement, we could state the time that engagement takes in terms of a normal prescription time and add the result to scrip count. Let's say 30% of the market only speaks Spanish or Polish. Patient engagement takes 3 minutes more on average. We would calculate 30% of all scrips to find how many will require extra time. Next, we would add .75 scrips (3min/4min) to each scrip.

Summary

The small window of opportunity for hospital markets requires a significantly lower time-to-delivery than retail. Because there are limitations to how much we can change the conversion cycle, we need to redistribute time by out-cycling processes that are not dependent on a finalized prescription.

We can out-cycle whole or partial processes of patient engagement and production functions of the conversion cycle. Understanding the conversion cycle is actually comprised of multiple, product specific production channels make it possible to further tune time-to-delivery for specific products, medical procedures, or prescribers.

Future articles will explore patient engagement and production out-cycling more in depth.

Exercise

List some the processes and steps in your conversion cycle and group them as patient engagement and production functions.

1. How much time does each function consume?
2. Can the process or any part of the process be completed 'without' a prescription?
   (Hint: Keep in mind that the future state may require out-cycling to be coupled with another change.)

Footnotes

[1] Residual counter demand refers to the remaining patients (scrips) that will not be serviced by alternative modes of a delivery matrix. (eg. bedside)

[2] We use the term stock rather than bulk because we will be making changes to inventory management.

[3] We will address how to create positive perceptions to add flexibility to perceived time-to-delivery in a future article.

[4] Future articles will talk about why WIP inventory must be limited and, in what circumstances, some WIP inventory can grow to expected demand for a period.

[5] Use of this rate does not imply its actual use by drug chains or its validity. It is used only as a frame of reference.

[6] The conversion cycle is comprised of multiple production channels. Whichever channel provides the best reference for staffing should be used as the base production channel.

About the Author

Sabrina Hannigan is a retired major drug chain executive with over three decades experience in site analysis and operations optimization. Upon retiring, she contracted with a healthcare consulting firm to consult on a broad range of operational topics specific to build-out of an outpatient pharmacy service.

As an independent consultant, Sabrina recognized that retail solutions were not transferable and created an outpatient pharmacy business model incorporating methods and processes experienced over forty years in manufacturing and retail.

Sabrina is passionate about the future of healthcare and envisions hospital-centric solutions for improving therapeutic outcome and population health. Towards this end, she continues to develop new processes and methods for outpatient pharmacies.