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Director's Forum

Evolving Pharmacist Productivity Models

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Leaders in health-system pharmacy are challenged to minimize costs, maximize revenue, and maintain or improve quality while simultaneously expanding services. Strong command of productivity and workload measurement is necessary to achieve these goals. This article reviews foundational pharmacy productivity concepts and key terminology, reviews historical pharmacy productivity models and their limitations, and considers new and evolving pharmacist productivity models.

The economic and political landscapes in US health care have reduced, and likely will continue to reduce, reimbursement payment to hospitals. In addition, there will likely be an expanded focus on mandates to improve quality outcomes and operational efficiency by doing more with fewer resources, increasing the pharmacist's focus on patient-centered care, improving patient satisfaction with pharmacy services, and establishing a higher degree of integration between various care transitions.[1] One of the major responsibilities of pharmacy directors is to ensure proper utilization of financial resources, including labor. As a result, pharmacy directors must understand productivity systems and the methods of managing a department's operational productivity.

Pharmacy productivity has been described since the early 1960s; in spite of these early studies, no productivity monitoring system or measurement techniques have been established as a gold standard for operations (dispensing, production processes) in health-system pharmacy practice.[2] Further, the measurement of individual pharmacist activity that includes patient care functions is difficult since the pharmacy practice model has changed from product-focused (number of doses dispensed) to patient-focused activities (dosage adjustments, adverse event monitoring).[3]

As practice models have evolved to become more patient-focused, there has also been growth in technology, automation, and access to patient information. Data produced from electronic medical records (EMRs) and computerized physician order entry (CPOE) systems can be used to track department and pharmacist patient care activities. The adoption of pharmacy information systems has allowed a shift from only monitoring traditional, product-based productivity metrics to new models that more effectively capture a department's dispensing and clinical activities.

The goal of this article is to provide pharmacy directors with a brief introduction to pharmacy productivity concepts and describe innovative methods of monitoring pharmacy productivity. Specifically the aims of this article are to (a) define productivity and its key terms, (b) explain traditional metrics used to measure productivity, and (c) introduce new and evolving pharmacist productivity models. After reviewing this article, the pharmacy director will have a better appreciation for ways to develop a productivity system that measures all the activities of a patient-centered pharmacy service.

UNDERSTANDING PRODUCTIVITY

Defining Productivity

In its most basic form, productivity is defined as the ratio of work outputs to labor inputs. A more robust definition for productivity in health care is stated as "individuals and work groups working in a coordinated action performing their work efficiently (with technical productivity) and effectively (with quality), forwarding the vision and commitment of the organization and their profession, while making a difference in their work environment."[4] In health-system pharmacy, leaders and managers use a productivity measurement to match staffing levels to the amount of work activities.

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The pharmacy director will review documents that report the productivity of the pharmacy department. Often productivity results will be expressed in a workload metric adjusted for a variable (eg, hours paid per patient day, doses dispensed per adjusted admission) or as a general number, such as 106% productivity. Having a general knowledge of the validity of workload data and productivity results will give the pharmacy director an initial target when revising a system or changing workload variables. For example, the term "106% productivity" means that the unit measured is working at 6% over a determined maximum productivity, most usually defined as 100%. **Table 1** provides an example of an institutional workload summary report, which can be used to describe the productivity of various pharmacy areas.

Key Terms and Descriptions

There are some terms and descriptions that are important to understand as a foundation to using productivity systems: driver, unit of service (UOS), fixed activities, fixed positions, variable activities, and variable positions. Understanding these 6 terms and descriptions helps the pharmacy director interpret basic productivity results and reports.

The *driver* is a metric that defines the variability of a productivity model; it correlates to the output of the individuals performing the work. In other words, the driver is a measurement that increases as overall workload increases and decreases when overall workload decreases. Examples of commonly used drivers are number of prescriptions filled or number of provider-entered orders verified.

The *unit of service (UOS)* is a metric that quantifies the amount of service (or output) produced. In health-system pharmacy, the "service" provided is complex and includes both discrete, measurable components (such as medication dispenses) and abstract components (such as cognitive services associated with clinical patient review). There is difficulty both in enumerating all elements of the service and in identifying ways to measure the abstract components. Thus, the UOS is a metric that combines and standardizes all elements of a department's work and ascribes a numerical value to it. The UOS is the count or weighted sum of the driver(s) over time. So, for the output of prescriptions, the UOS is the number of prescriptions dispensed per hour. This number represents the work being produced. The UOS can be used to identify the targeted amount of time necessary to complete the work.

All work activities in a department can be classified as either fixed or variable. *Fixed activities* are those work activities that do not vary based on changes in the workload driver. For example, a monthly staff meeting is a fixed activity because the amount of work time spent at the meeting does not vary based on changes in patient volume or acuity. Conversely, *variable activities* are those that respond to changes in work volume. For example, verification of prescriber orders is a variable activity because the amount of this work activity is correlated to the number and acuity of those orders. Most employees perform both fixed and variable activities. *Variable positions* are those positions in which at least some portion of the work is responsive to

Table 1. Example workload summary report[a]

Bi-weekly pay period report								
Cost center	**UOS**			**Worked FTE**				**Productivity (%)**
	Description	**Actual**	**Target**	**Actual**	**Flex target**	**Variance**	**Budget**	
Central pharmacy	Weighted verifications	5,636	5,975	150.2	152.4	2.2	147.9	101.4
Nuclear pharmacy	Weighted doses	120	112	3.3	4.1	0.8	3.7	122.7
ACC pharmacy	Procedure hour	290	307	5.0	5.1	0.1	5.2	102.4
Infusion pharmacy	Weighted verifications	1,375	1,077	19.9	23.8	9.3	20.3	119.6
Totals				**178.4**	**185.4**	**12.4**	**177.1**	**103.9**
								Favor

Note: ACC = ambulatory care center; FTE = full-time equivalent; UOS = unit of service.
[a]Data do not reflect actual reported values derived from The Ohio State University Wexner Medical Center.

fluctuations in the workload driver. The workload of these positions increases or decreases proportionally as the driver increases or decreases (ie, increased prescription volume, order verifications, or kinetic consults equates to increased workload for the pharmacist). *Fixed positions* are those in which no portion of work activities are responsive to changes in the workload driver. For example, pharmacy managers, drug information pharmacists, medication safety pharmacists, or informatics pharmacists perform work that does not directly contribute to the driver (where the driver is defined as dispensing prescriptions or verifying orders).

Calculating Productivity

As stated previously, productivity is simply a ratio of the amount of work outputs to labor inputs. Conceptually, the labor inputs are relatively uncomplicated; the *inputs* are typically worked hours for a defined time period. Worked hours are distinguished from paid hours and do not include paid benefit time such as vacation, sick leave, or business leave. Productivity ratios are often divided into labor productivity ratios (hours worked or paid per unit of output to allow for more meaningful and actionable data (ie, the department is 1 full-time equivalent [FTE] understaffed).[2] **Table 2** shows an example of a calculation that helps clarify how the key terms and descriptions are used to represent productivity.

TRADITIONAL PHARMACY METRICS

Productivity Metrics

Data show that most hospital pharmacies dedicate more than 20% of staff time to clinical services, yet productivity monitoring systems have historically focused on distributive activities.[6] Examples of commonly used productivity metrics and their various limitations are shown in **Table 3**. Traditional pharmacy productivity metrics are commonly used because (a) they can be derived from easily collected financial data; (b) they provide consistent information, as long as the baseline service model stays the same; and (3) comparative benchmark figures are easily obtainable. Although these metrics are commonly used, the adoption of robust EMRs now enables pharmacy departments to begin to quantify and account for clinical pharmacy services in addition to distributive pharmacy services.

Table 2. Productivity calculation example

Unit of service (verifications per pay period)[a]	1,600
Target variable hours	80
Fixed hours per pay period	8
Total target hours	88
Worked hours	80
Productivity (%)	110
(+/-) Full-time equivalent (FTE)	+0.1

Note: These positions are variable and have 8 hours of fixed time per pay period. To complete 1,600 verifications per pay period, 80 target variable hours are necessary. However, to incorporate the 8 fixed hours during each pay period, the department must verify orders faster than the average to meet this increased demand.

[a]Inpatient generalist pharmacists verify an average of 20 orders per hour. Over a 1-week pay period, a total of 1,600 orders were verified.

FUTURE OF PRODUCTIVY

Operational Productivity Model

The development of an inpatient operational pharmacy productivity model by Naseman and colleagues provided an innovative way to more accurately measure the operational productivity of medication order management.[7] This model was compared with commonly used pharmacy productivity metrics including pharmacy-adjusted admissions (PAA)/case-mix index (CMI) and PAA/pharmacy intensity score (PIS). Although the PIS can provide a more accurate measure of pharmacy costs compared to CMI, it still assumes that the total cost of medications a patient receives may have some correlation to the total time required for a pharmacy department to manage those medications. However, pharmacy formularies have several low-cost, time-intensive medications (eg, custom ophthalmic compounds or vancomycin – pharmacokinetic monitoring). Therefore, Naseman et al developed a weighted verifications (WV) model that selected medication order verifications as the primary workload driver for clinical generalist pharmacists and doses dispensed for pharmacy technicians. Results showed that the WV model highly correlated with the CMI- and PIS-based models with less period-to-period variation. Overall, the advantage of this inpatient model is its ability to separate productivity monitoring by job function (pharmacist vs technician), which helps guide hiring and staffing decisions. Although this inpatient model provides a way to capture the operational activities of pharmacists, it does not provide information regarding the recording of patient-centered clinical activities.

Clinical Productivity Models

Although clinical and cognitive pharmacy services have a great impact on patient care outcomes,

Table 3. Traditional productivity metrics and their limitations

Productivity metric	Limitation
FTEs per patient-adjusted day	Outpatient care is estimated using revenue adjustment factor (total revenue/inpatient revenue)
FTEs per dose dispensed	Difficult to determine the exact definition of "dose" (eg, insulin units)
Patient-adjusted admission per case mix index (CMI)	CMI acuity adjustment factor is not pharmacy labor resource based (cost of medication use)
Total pharmacy cost per adjusted discharge	Assumes that medication costs are directly proportional to the workload involved

Note: FTE = full-time equivalent.
Adapted from Rough SS, McDaniel M, Rinehart JR. Effective use of workload and productivity monitoring tools in health-system pharmacy, part 1. *Am J Health Syst Pharm.* 2010;67(4):300-311.

many pharmacy departments do not consistently track, analyze, and report on these services because they may be abstract, neither discrete nor easily countable, and typically require manual documentation.[6] For the ongoing reporting of clinical interventions, it is necessary to develop automated methods for documentation by maximizing the capabilities within EMR systems. Pawloski and colleagues described the development of a clinical pharmacy productivity metrics model that was able to capture the clinical component of pharmacist activities.[8] This model maximized technology to develop a tool within the EMR that electronically captured clinical pharmacy productivity data without the need for manual tracking of documentation. Overall, the number of measured interventions increased, likely due to the decreased need for manual tracking, increased productivity reporting awareness, and the emphasis on the importance of documentation. Contrary to the inpatient operational productivity model by Naseman and colleagues, this study only evaluated the activities performed by clinical pharmacists and did not include inpatient or outpatient staff pharmacists.

Merging Productivity Models As the Optimal Productivity System

The optimal system for reporting and measuring workload combines the operational and clinical activities into a single system that provides a comprehensive view of pharmacy activities. Such a monitoring system captures all aspects of a department's work with no additional manual documentation effort required on the part of the employee and allows a manager to determine staffing needs at the position-type level (eg, technician, generalist, specialist). This model should account for (a) fixed activities/positions, (b) technician and pharmacist work associated with dispensing activities, and (c) clinical pharmacy activities. This evolving method of workload measurement is necessary to accurately capture all patient-centered pharmacy activities to best represent a department's overall productivity.

CONCLUSION

There is no standardized productivity monitoring system to evaluate the efficiency and effectiveness of pharmacists. Traditional pharmacy productivity measures use operational and dispensing activities metrics. These methods have been used to evaluate distributive pharmacy services, but they do not accurately capture the clinical pharmacy activities. New evolving productivity models incorporate clinical pharmacy activities as part of the pharmacists' workload. As new and combined models evolve, the pharmacy director will have better tools for developing a productivity system that measures all the activities of a patient-centered pharmacy service.

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