ESTABLISHING A WORKLOAD PRODUCTIVITY TARGET IN AN OUTPATIENT INFUSION PHARMACY

Kimberly A. Haverstick
University of Central Arkansas
Assistant Director of Pharmacy
University of Arkansas for Medical Sciences
4301 W. Markham Slot 721-11
Little Rock, AR 72205
(501) 772-6914
khaverstick@cub.uca.edu

Mark E. McMurtrey
College of Business 102-H
University of Central Arkansas
201 Donaghey Ave.
Conway, AR 72035-0001
(501) 450-3411
markmc@uca.edu

ABSTRACT

Health-system pharmacies are under increasing pressure to maximize resources and improve efficiency, as the cost of healthcare is rising and reimbursement for medications is becoming increasingly complex. One strategy for optimizing efficiency is to utilize workforce productivity metrics to ensure the optimal staffing. While there have been many published examples of productivity-tracking models for health-system pharmacies in general, there are gaps in the literature regarding outpatient infusion pharmacy productivity metrics, as these pharmacies have unique workflow patterns and considerations. This paper describes some of those special considerations for infusion pharmacies, and proposes a potential method for tracking workload productivity in a way that addresses those special factors. Also discussed are the limitations of this method, as well as areas for future exploration in tracking productivity in an infusion pharmacy.

INTRODUCTION

In today's healthcare landscape, hospitals are operating on increasingly thin margins. As medication costs continue to rise (Kesselheim, et al.) and healthcare becomes more complex (Vest, 2019), hospital pharmacies are under pressure to improve operating efficiencies and reduce costs. While personnel accounts for only about 20% of a hospital pharmacy budget (Rough, et al. Feb 2010), it is still important for pharmacy leaders to consider ways to optimize the workforce to avoid understaffing or overstaffing, both of which can have negative implications for hospitals. Understaffing can contribute to decreased patient safety and increased costs (Rough, et al. Feb 2010), while overstaffing can result in inefficiency and unnecessarily increased personnel costs.

Health-system pharmacies can optimize workforce size by utilizing operations management principles such as the establishment of productivity metrics, and comparing these metrics to internal and external benchmarks. Such data can also be helpful in evaluating whether or not there are trends or patterns that, if known, can help inform decisions on adjusting pharmacy staff levels accordingly.

As described by Murphy (2000), benchmarking is a continuous process used to identify and understand variations in practices compared to either an internal or external standard, and therefore potentially reduce these variations. Reducing variations in processes can then increase efficiency. Additionally, benchmarking can improve patient care and lead to cost savings for the health-system. Vest (2019) further highlights that benchmarking can help prevent missed opportunities for revenue generation. It can also allow flexible scheduling that could help control labor costs.

EVALUATION OF CURRENT LITERATURE

Most published models for establishing labor productivity metrics involve simple calculations where some measure of output (such as units produced or orders processed) is in the numerator, and input (such as hours worked) is in the denominator (Chew, 1988). Previous articles have explored the importance of the development and use of productivity metrics in many different settings, including the healthcare industry.

Specific to the pharmacy setting, Rough, McDaniel and Rinehart (Feb 2010) describe the benefits of productivity benchmarking. Quantifying time spent on various activities, and then comparing with similar institutions allows pharmacies to identify areas for improvement compared to industry standards. Another benefit of benchmarking is demonstrating to hospital administration the value of pharmacy services. Internal benchmarking against an institution's own historical data allows for evaluation of the impact of operational changes, as well as identifying ways to reduce costs.

In addition to these potential benefits, Rough, et al. (Feb 2010) also outline the potential limitations and challenges with productivity benchmarking. External benchmarking can be especially challenging when processes and products are variable among different locations. Even internally, there can be a great deal of variability among pharmacy sites. Another possible challenge is that focusing solely on output numbers (such as number of orders processed) can lead to the faulty assumption that high volume but low quality production sites are performing optimally, and vice versa. If strictly enforced, using such productivity metrics can lead to unnecessary reductions in staffing, would could decrease patient safety and increase costs. Additionally, such production-based metrics do not capture order review, consultations, and other cognitive activities.

To address these limitations, Rough, et al. (Feb 2010) offer a few suggestions for properly utilizing productivity metrics in health-system pharmacies. They emphasized the need to create different productivity metrics for different divisions within the pharmacy department. This will allow managers to determine which activities and metrics are important to track for each distinct area. Additionally, the use of intensity-weighted productivity metrics is suggested as a way to address the limitations of utilizing simple labor metrics that do not consider the full range of activities.

Naseman, et al. (2015) understood that variability in workload for different types of medication orders requires a productivity metric that allows for weighting based on the level of complexity of the type of order. They attempted to create a metric whose workload driver was order verification.

Medications were grouped together by class, and each class was assigned a time standard called the "medication complexity weight." This "weighted verifications" model addresses some of the limitations of using a simplified labor productivity metric that does not take into account varying levels of complexity with different medications. However, it still does not account for activities that are not directly tied to processing orders.

UNIQUE STAFFING CONSIDERATIONS OF INFUSION PHARMACIES

Outpatient infusion pharmacies are complex environments, with many unpredictable and highly variable factors that make it difficult to accurately measure productivity. Chemotherapy and other infusion medications are often complex and time-consuming to prepare. Pharmacists spend a great deal of time on cognitive tasks such as order review and providing education to nurses and providers. Also, infusion pharmacies generally have stringent cleaning requirements, which also demand a significant proportion of time from the pharmacy staff.

Reichard et al. (2000) aimed to develop a way to accurately assess workload in outpatient infusion pharmacies, especially across multiple sites that varied in size and complexity. To do so, they proposed using current procedural terminology (CPT) codes as a way to gather the necessary productivity information. CPT codes are used to bill for services performed during a patient's clinic visit, including administration of medications. Different types of medications have different CPT codes, based on the complexity of the administration. While CPT codes are primarily used for billing purposes, they also can be useful for reporting on productivity, as they are easily retrieved from the medical record, and they have the ability to stratify medications by complexity.

Reichard et al. focused on fourteen CPT codes, which they then grouped into eight main categories of medications, each with varying degrees of associated pharmacy workload. The group then did time studies to measure workload for each of the eight categories, and assigned that value to each CPT code. The volume of each CPT code billed during a certain timeframe was multiplied by the time standard established for that CPT code. These products were then summed to achieve a total time spent preparing these medications. As the authors note, the advantage to this method is that it is standardized and applicable across multiple sites. It shares the limitation of previously discussed models in that it does not address non order-specific tasks, which can be significant in an infusion pharmacy.

Achey et al. (2018) also developed a model for measuring productivity in an outpatient oncology infusion pharmacy. Acknowledging the complexity of oncology care, they attempted to find a way to measure productivity that was easily achievable (i.e. easily obtained from the electronic medical record), yet accounted for the complexity and variability of chemotherapy medication preparation. They focused on two main activities as the drivers of workload: pharmacist verification of orders and technician compounding activities, pulling historical data for the time spent on each of those activities from the electronic medication record. For each medication, the pharmacist verification time and technician preparation time were combined into a relative value unit (RVU). One RVU was equivalent to one hour. The sum of the RVUs for each medication were then combined to calculate a total RVU. Using data from a two-year historical period, they were able to establish a baseline RVU to which any future RVU could be compared to assess for trends. This approach to development of a benchmark helps address the complex nature of compounding in an infusion pharmacy, since each medication would have an RVU assigned that is based on the preparation time required, so that drugs that are more complex are weighted more heavily. It still does not capture any of the fixed activities, so it still may not give an accurate measure of productivity.

This highlights another complicating factor in the use of traditional productivity metrics, which is that not all of the work performed in an infusion pharmacy can be measured by data that is easily extractible from the electronic medical record. While some tasks are variable based on number of orders to be dispensed, others are fixed in nature, requiring a certain amount of time, no matter how many patient orders are processed. It is easy to gather data from the electronic medical record for metrics directly related to orders processed, but tracking time spent on other activities can be more challenging. As described by Rough, et al. (March 2010), it is often necessary to perform time studies, using methods such as direct observation or self-reporting to gather time data. This is helpful for cognitive and technical tasks that are not tied directly to number of orders processed.

In an infusion pharmacy, especially one that prepares a significant number of chemotherapy infusions, the percentage of time required for fixed activities (such as cleaning, purchasing, and restocking) has increased significantly over the past decade. Part of the reason for this is that regulatory standards for cleaning and maintenance of IV rooms and equipment have changed significantly over the past 10 to 15 years. United States Pharmacopeia (USP) first published General Chapter <797> Pharmaceutical Compounding – Sterile Preparations in 2004. Chapter <797> is an enforceable standard for how sterile compounding pharmacies should operate (USP, 2008). The standards for daily and monthly cleaning of rooms, equipment, and all items brought into the clean room spaces increased the overall time required for these activities. The more rooms and laminar airflow hoods that are present, the more time required for cleaning. Additionally, upcoming requirement for implementation of USP General Chapter <800> for healthcare settings that handle hazardous drugs will add even more requirements for cleaning and decontamination of hazardous drug residues, and therefore time spent on fixed technical tasks (USP, 2016). Since outpatient infusion pharmacies generally prepare a large amount of chemotherapy, USP <800> will have a substantial impact once it becomes enforceable.

Figure 1: Technical duties performed by UAMS Cancer Institute Pharmacy, FY2010 to FY2021

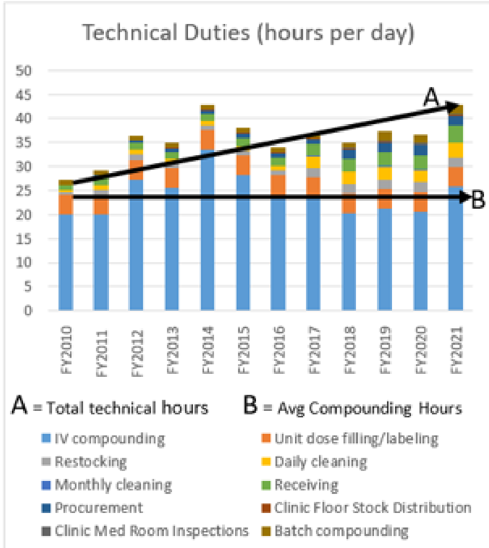

Figure 1 summarizes the major technical tasks performed by UAMS Cancer Institute Pharmacy staff, and the corresponding hours spent performing those tasks. Time data was gathered by a combination of direct observation, self-reporting, and time stamp data from the electronic medical record. These technical duties can be grouped into those that are tied to number of orders processed (sterile compounding, unit dose dispensing) and those that are independent of orders processed (restocking, cleaning, receiving, procurement, floor stock distribution, medication room inspections, and anticipatory batch compounding). Figure 1 highlights the fact that, while mean number of orders processed (represented by hours spent compounding) has remained fairly flat between fiscal year 2010 and fiscal year 2021, total time spent on technical tasks has increased by 60%, with additional increases expected in fiscal year 2022.

One major reason for the increase in time spent on technical tasks is due to regulatory changes, and increased scrutiny on sterile compounding. Previous published models for measuring infusion pharmacy productivity have not included these technical types of tasks not directly tied to numbers of orders processed, likely because they are labor intensive to gather. Additionally, previous models have assumed that such tasks are nominal, and are not drivers of workload (Achey, 2018). As described above, however, it may be helpful to develop metrics that include these tasks as well.

IDENTIFYING DRIVERS OF WORKLOAD IN AN INFUSION PHARMACY

In creating a productivity metric that is inclusive of tasks performed in an outpatient infusion pharmacy, defining the main workload drivers is important. These can be broken down into pharmacist activities and technician activities. The main workload drivers for pharmacists are order verification and clinical review, final product validation, and clinical interventions. Data for all of these activities can potentially be derived from the medical record, depending on system configuration and workflows. The primary drivers of workload for technicians can be subdivided into fixed duties (such as cleaning, restocking, procurement) and order-dependent variable duties (such as preparing medications for dispensing and sterile compounding of intravenous medications). While the data for order-dependent duties can be captured from the electronic medical record, the fixed duties may require direct observation, self-reporting, or the use of historical data to estimate workload. Table 2 summarizes this information.

Table 2: Major workload drivers in an outpatient infusion pharmacy

Workload Driver	Fixed or Variable?	Measurement Tool
Cleaning	Fixed	Time Studies
Compounding	Variable	Medical Record
Interventions	Variable	Medical Record
Order verification	Variable	Medical Record
Procurement	Fixed	Time Studies
Receiving	Fixed	Time Studies
Restocking	Fixed	Time Studies
Dispensing Simple meds	Variable	Medical Record

The largest driver of workload in an infusion pharmacy is orders processed. However, simply using number of orders processed as the output metric in the productivity equation does not accurately capture the varying complexity of different types of medication orders. Some medications, such as oral tablets given as premedication before chemotherapy, require minimal time to process. Other medications, such as complex chemotherapy infusions or investigational drugs take longer to prepare, compared to simple medications.

One potential way to account for the varied nature of different types and complexities of pharmacy tasks is to use an output metric of hours of work produced, rather than number of tasks performed. One hour of work produced would equate to one relative value unit (RVU). By measuring output by the number of hours of work produced, more complex tasks that take longer to complete will essentially be weighted heavier than tasks that take less time to complete. Also, measuring output in time spent producing the work provides a standard way to measure across all major workload drivers, rather than just measuring a single output, such as orders processed.

Using RVUs to measure productivity is not a new concept. As discussed previously, Achey et al. (2018) proposed a model that utilized historical data from the electronic medical record to assign RVUs to individual medications, and then a total RVU for a given timeframe could be calculated based on medications prepared in a given month (i.e. multiply each medication dispensed by its respective RVU, and then sum all of those together to calculate a total RVU). RVUs are also often utilized by physicians to determine productivity and reimbursement (Bendix, 2014). However, combining output data from multiple different types of activities in an outpatient infusion center, including both variable and fixed workload drivers, has not yet been proposed in the literature.

Measuring Variable Component of Workload

To ease the burden of gathering data to measure productivity, it is helpful to extract data from the electronic medical record whenever possible (Achey, 2018). Reports can be automated to run at predetermined intervals (such as monthly or yearly), or on an ad hoc basis. Time spent on order verifications, medication preparation, and compounding are all captured by time stamps generated at various points in the process. Time spent on clinical interventions can be captured in the electronic medical record if pharmacists have a documentation tool that allows for discrete entry of time spent working on the intervention. That discrete data can then be extracted into reports and combined with other output data from external sources to calculate an overall output number.

MEASURING FIXED COMPONENT OF WORKLOAD

Measuring the fixed component of workflow in an infusion pharmacy can be more daunting than simply extracting data from the medical record. One option would be to manually capture actual time spent performing various tasks such as cleaning or procuring medications. As mentioned previously, this can be done by performing direct observational time studies, or by allowing self-reporting by staff members. This can be very tedious and time consuming to gather on the front end, and to calculate on the back end. However, since these tasks do not fluctuate much from day to day, an alternative would be to do initial time studies to establish a baseline amount of time spent doing various tasks, and use those amounts in the overall output calculation each month. Then periodically, these amounts could be reassessed. Major changes in practice (such as new standards that increase amount of time spent cleaning) or periods of rapid expansion (such as in the first operating year of a new pharmacy) might necessitate more frequent reassessment. Even if operations are relatively stable, annual reassessment would help avoid outdated or stagnant productivity targets that no longer reflect actual operations.

The amount of time spent doing fixed tasks will vary greatly from site to site, and will be dependent on facility design and institutional policies and procedures. In spite of the variability, it can still be important to capture this segment of the workload in the productivity metric.

COMBINING OUTPUT AND INPUT DATA TO CREATE A PRODUCTIVITY METRIC

Once all of the workload drivers have been defined, and a method for measuring the RVU for each driver has been identified, all of those can be summed together each month to come up with a total output RVU to use in the numerator of the productivity equation. The actual number of hours worked, which can be obtained from the time keeper system, could be used as the workload input in the denominator of the equation. Therefore, the productivity equation would be Productivity = Total RVU / Total Hours Worked. The result of this calculation would be the productivity metric.

ESTABLISHING A PRODUCTIVITY TARGET

A productivity metric alone is not meaningful; it must be compared to a target or benchmark in order to derive meaning from it. While this is important, there is very little in the literature regarding what those benchmarks should be. As Vest, et al. (2019) described, there are several barriers to establishing a standard approach across different institutions, or even within the same institution, as described previously. In spite of these difficulties, it is still useful for institutions to establish their own targets or internal benchmarks for productivity. Over time, as more institutions publish data about the targets that are meaningful to their practice, it may be possible to establish an industry-wide productivity benchmark for the outpatient infusion pharmacy setting.

One approach to setting an internal target would be to expect that the primary workload drivers will account for 75% of employees' actual hours worked. The remaining 25% would represent all activities that cannot be measured, quantified, or anticipated, and would also serve as a buffer for unplanned staff shortages, surges in volume, or other unforeseen circumstances.

As an example, for the time period of October 1, 2020, through March 31, 2021, the total RVU for the UAMS Cancer Institute Pharmacy would have been 11,312 hours. The actual hours worked for the same period was 10,892. The resulting productivity calculation would be:

$$\text{Productivity} = \frac{11{,}312}{10{,}892} = 1.04 \qquad (1)$$

The resulting productivity metric of 1.04 exceeds the target of 0.75. This indicates that the expected amount of time it would take to complete the primary tasks (i.e. the RVU) exceeds the actual number of hours worked. Since some of the time that comprises the RVU was actually real time data from the electronic medical record, this most likely means that staff did not spend as much time as expected on tasks where the amount of time was estimated from historical time studies (i.e. cleaning, restocking, etc.). Over time, if staffing levels are not increased so that the calculated productivity is closer to the target of 0.75, it could lead to staff burnout, increased potential for medication errors, and potentially decreased compliance with regulatory standards for things such as proper cleaning of IV rooms and equipment.

If the calculated productivity had been below target, it would indicate that staffing levels may be too high (i.e. actual hours worked exceeds expected hours). In the short term, this could happen when patient volume drops temporarily or unexpectedly. In the long term, productivity numbers consistently below the target would signal a need to re-evaluate staffing to reduce potential waste.

Establishing a productivity target can be helpful in determining an appropriate staff size based on workload. For example, based on a six month RVU of 11,312, and a target productivity of 0.75, dividing the RVU by the productivity target will give an optimal number of hours worked for the six month period. Dividing the optimal number of hours worked in this six month period by six would give the monthly optimal hours worked. Dividing this number by 160, which is the number of hours for one full time equivalent (FTE) in one month, gives the ideal number of FTEs.

$$\text{Optimal hours worked} = \frac{\text{RVU}}{\text{Target productivity}} = \frac{11{,}312}{0.75} = 15{,}083 \text{ hours} \qquad (2)$$

For the six month period evaluated for the UAMS Cancer Institute Pharmacy, the optimal number of FTEs per month based on the productivity target and the RVU produced would have been 15.7.

$$\text{Optimal number of FTE} = \frac{\begin{array}{c}\text{Monthly}\\ \text{Optimal hours worked}\end{array}}{160} = \frac{2514}{160} = 15.7 \text{ FTE} \qquad (3)$$

The actual number of FTEs per month worked during this period was 11.3. This indicated that there is a potential for increasing staff by approximately four employees without having a negative impact on productivity.

LIMITATIONS

There are limitations to calculating productivity as described in this paper. While the calculation takes into account many of the drivers of workload in an infusion pharmacy, it can be cumbersome to measure the time spent on fixed tasks. However, that portion of the metric would only need to be calculated periodically, so it should not add a significant burden on a monthly basis. One possible way to automate this portion of the calculation would be to document time spent for each of those tasks in a discrete format (such as within an IV workflow software or in the electronic medical record). This would allow the data to be extracted and incorporated into the calculation.

Another limitation is that it is not possible to account for every aspect of workload, so no metric will be completely inclusive. And as previously discussed, there are many factors that might make it difficult to apply this approach across multiple settings. Also, it is important to remember that productivity metrics should be assessed periodically and adjusted as needed due to things like major shifts in practice, regulatory changes, black swan events, etc.

CONCLUSION

As healthcare costs continue to rise, pharmacies are under increasing pressure optimize resources. Measuring workload productivity is vital to ensure appropriate staffing to achieve the right balance of quality, safety, and efficiency. Though there have been productivity models published for hospital pharmacies in general, there are few that specifically address the unique challenges of infusion pharmacies. The calculation of a total RVU that combines both fixed and variable workload data is a unique approach that accounts for the complexity of compounded sterile medications and the high percentage of fixed tasks in an infusion pharmacy. This may be a more accurate reflection of workload than simply using number of orders processed. Dividing the total RVU by the actual hours worked would provide a productivity metric that could be tracked over time to assess any trends or need to adjust staffing levels. Comparing the productivity to a target of 0.75 could provide meaningful insight into how appropriately staffed the pharmacy was during a certain period of time. Achieving the productivity target could help increase patient safety, reduce staff burnout, and prevent waste.

REFERENCES

References available upon request.