Establishing a Workload Productivity Target in an Outpatient Infusion Pharmacy

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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 on 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.

Keywords: pharmacy, infusion, productivity, workload, metrics, staffing, efficiency

INTRODUCTION

In today's economy and 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 costs generally account 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 pharmacy workforce to avoid understaffing or overstaffing, both of which have negative implications for health systems. Understaffing can contribute to a decrease in patient safety and an increase in 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 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 create the ability to potentially reduce these variations. Reducing variations in processes can lead to increased efficiency. Benchmarking can be used to evaluate and help support the development of new programs. Additionally, it can ultimately improve patient care and lead to cost savings for the health-system. Vest (2019) further highlights that, in addition to cost savings, benchmarking can help prevent missed opportunities for revenue generation. It can also provide a level of insight into workflow efficiencies that can allow flexible scheduling (i.e., upsizing or downsizing based on predicted volumes) that can help control labor costs.

Evaluation of Literature on Productivity Metrics in Health-System Pharmacies

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). Earlier 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 institutions to determine if there is room for improvement compared to industry standards. Another benefit of benchmarking is the opportunity to demonstrate 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 opportunities 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, decreased patient safety, and increased costs. Additionally, such production-based metrics do not capture clinical activities such as order review, consultations, and other cognitive activities.

To address these limitations, Rough, et al. (Feb. 2010) offered 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, as inpatient pharmacy operations and needs are different from those of clinical pharmacy, outpatient infusion pharmacy, retail pharmacy, etc. Additionally, the use of intensity weighted productivity metrics is suggested to address the limitations of utilizing simple labor metrics that do not consider the full range of pharmacy 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, and the level of activity required by pharmacy personnel. 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 model, called the "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 Outpatient Infusion Pharmacies

While there is a significant amount of published material regarding the importance of establishing productivity benchmarks and the use of such benchmarks in healthcare settings, there are still gaps in the established literature regarding optimal workload and productivity benchmarks specific to outpatient infusion pharmacy settings. These are complex environments, with many unpredictable and highly variable factors that make it difficult to accurately measure productivity. Chemotherapy and other infusion medications dispensed from such pharmacies are often complex and time-consuming to prepare. Also, infusion pharmacies generally have significant 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 the basis for their productivity measurement. 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 and the level of payment required. 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 tasks that are independent of the number of orders processed, 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 helps address the complex nature of sterile compounding in an infusion pharmacy, since each medication would have an RVU assigned that is based on the preparation time required, so that preparations that are more complex are weighted more heavily. It still does not capture any of the activities that are not based on number of orders processed, so it may not give an accurate measure of productivity.

One complicating factor in the use of traditional productivity metrics is that not all of the work performed in an infusion pharmacy varies in proportion to numbers of orders. 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. While it is easy to gather data from the electronic medical record for metrics directly related to orders processed, 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.

While time consuming, gathering data on time spent performing these fixed tasks can provide important insight into workflow patterns, especially as they change over time. To evaluate the increased amount of time spent on technical tasks, the UAMS Cancer Institute Pharmacy staff gathered time data by a combination of direct observation, self-reporting, and time stamp data from the electronic medical record. The technical duties performed by staff in this pharmacy can be grouped into those that are tied to number of orders processed (sterile compounding and 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). The results of the time studies showed that that, while mean number of orders processed remained flat between fiscal year 2010 and fiscal year 2021, total time spent on technical tasks increased by approximately sixty percent during that same period.

Part of the reason for this increase in time spent on fixed activities (such as cleaning and restocking) over the past decade 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) published General Chapter <797> Pharmaceutical Compounding – Sterile Preparations in 2004, and subsequently updated the chapter in 2008 and again in 2021. 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. Significantly more time is spent cleaning and disinfecting laminar airflow hoods, as well as disinfecting all items brought into and stored in the cleanroom areas today than before the implementation of USP <797> standards. 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 prepare 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 significant impact once it becomes enforceable. While these changes promote safe preparation of medications, the also increase the proportion of time spent performing technical tasks not tied to (or easily measured by) the number of orders processed.

Earlier 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, earlier models have assumed that tasks such as cleaning are nominal, and are not drivers of workload (Achey, 2018). As described above, however, due to the increased percentage of time spent performing such tasks, especially in a pharmacy whose primary business is sterile compounding of hazardous drugs, it may be important 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 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, and 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 1 summarizes this information.

TABLE 1
SUMMARY OF MAJOR WORKLOAD DRIVERS FOR UAMS CANCER INSTITUTE 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 drivers of workload in an infusion pharmacy are those related to number of orders processed (i.e., order verification and compounding). 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. 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 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 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. This data can then be combined with other output data from external sources to calculate an overall output that is reflective of the main workload drivers.

Some of the major drivers of workload in the infusion pharmacy setting can be directly measured and captured by the electronic medical record. These include orders verified, simple medications dispensed, and sterile compounds prepared. Each of these activities can be assigned standard time values, or RVU, either by using historical data to determine mean time spend on an activity, or by using national benchmarking data if available. Many of these data points can be captured in the electronic medical record. That discrete data can then be extracted into reports, and then the number of each type of activity performed can be multiplied by the standard time value for that activity to come up with the total time value of the work performed. It is worth mentioning that, depending on the specific workflow and system configuration, some of these data points may not be available within the medical record for some institutions.

Measuring Fixed Component of Workload

Measuring the fixed component (i.e., not dependent on number of orders processed) of workflow in an outpatient infusion pharmacy can be more daunting than simply extracting data from the medical record. One option would be to perform time studies for 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 and to calculate. However, since these tasks do not fluctuate much from day to day, once initial time studies were conducted to establish a baseline amount of time spent doing various tasks, those amounts could be used each month and would not need to be recalculated frequently. 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 of time data. 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 such as cleaning will vary greatly from site to site and will be dependent on things like the number of rooms in the cleanroom suite, the number of laminar airflow hoods and biological safety cabinets to be cleaned, and institutional policies and procedures. Despite the variability in actual amount of time spent performing such tasks, it can still be important to capture this segment of the workload in the productivity metric, as otherwise the calculation may be skewed.

Combining Workload Output and Input Data to Create a Productivity Metric

Once 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 timekeeper system, could be used as the workload input in the denominator of the equation. Therefore, the productivity equation would be:

$$\text{Productivity} = \frac{\text{Total RVU}}{\text{Total Hours Worked}} \tag{1}$$

The numerator in this equation represents the expected time that it would take to perform the essential tasks in the pharmacy during a set period of time. The denominator represents actual hours worked for the same period. The result of this calculation would serve as the productivity metric.

Establishing a Productivity Target

A productivity metric alone is not meaningful; it must be compared to a target or benchmark 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. Some of these are the variations in practice among various sites, the difficulty in measuring the value of cognitive work, the increasing emphasis on value-based care, and the unique concerns of inpatient vs. outpatient settings. Despite 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. The UAMS Cancer Institute Pharmacy chose 0.75 as the productivity target for the purposes of this analysis.

To apply this method of calculating productivity, the UAMS Cancer Institute Pharmacy applied the above methods of assigning RVUs to each of the major workload drivers for the period of October 1, 2020, through March 31, 2021. The total RVU for the UAMS Cancer Institute Pharmacy for this time was 11,312 hours. The actual hours worked for the same period was 10,892. The resulting productivity calculation is represented in this equation:

$$\text{Productivity} = \frac{11{,}312}{10{,}892} = 1.04 \tag{2}$$

The resulting productivity metric of 1.04 exceeded the target of 0.75. This indicated that the expected amount of time it should have taken to complete the primary tasks (i.e., the RVU) exceeded the actual number of hours worked. This most likely means that staff did not spend as much time as expected on the tasks evaluated. 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 cleaning of IV rooms and equipment.

If the calculated productivity had been below target, it would have indicated 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.

The establishment of a productivity target can be helpful in determining an appropriate staff size based on workload. Dividing the RVU for a particular time period by the productivity target will give an optimal number of hours worked for that period of time. Further, dividing the optimal number of hours worked in that time period by 160, which is the number of hours for one full time equivalent (FTE) in one month, gives the ideal number of FTEs for that period.

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

$$\text{Optimal hours worked } = \frac{\text{RVU}}{\text{Target productivity}} = \frac{11{,}312}{0.75} = 15{,}083 \text{ hours} \tag{3}$$

$$\text{Optimal number of FTE } = \frac{\text{Monthly optimal hours worked}}{160} = \frac{2{,}514}{160} = 15.7 \text{ FTE} \tag{4}$$

LIMITATIONS

There are limitations to calculating productivity as described in this paper. While the calculation accounts for many of the drivers of workload in an infusion pharmacy, it can be cumbersome to measure the time spent on tasks not directly performed in the electronic medical record. However, that portion of the metric would only need to be calculated periodically, so it should not add a significant burden when calculating the monthly productivity number. Another limitation is that it is not possible to account for every aspect of workload (phone calls, time spent on quality improvement, patient education, troubleshooting, etc.), 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 different practice 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, and black swan events. Future studies may be helpful to evaluate the potential for further automating the process of collecting data by leveraging technology such as IV workflow management software.

CONCLUSION

As healthcare costs continue to rise, health systems are under increasing pressure to make the best use of resources, including personnel. Workload productivity measures are vital to ensure that each area is appropriately staffed to achieve the right balance of quality, patient safety, and efficiency. Though there have been productivity models published for health-system pharmacies in general, there are few that specifically address outpatient infusion pharmacies, which have several unique challenges. The calculation of a total RVU that combines both fixed and variable workload data is a unique approach that better accounts for the complexity of compounded sterile medications and the high percentage of fixed tasks (especially cleaning) in an infusion pharmacy 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 calculated productivity to a target of 0.75 could provide meaningful insight into how appropriately staffed the pharmacy was during a certain period. Achieving the productivity target could help increase patient safety, reduce staff burnout, and prevent waste.

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