

Effective use of workload and productivity monitoring tools in health-system pharmacy, part 1

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The use of operational benchmarking is increasing within health systems as a tool for continuously measuring and improving

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individual departmental performance and evaluating departmental success. Pharmacy departments are often expected to incorporate benchmarking data into their annual budgeting process. Productivity monitoring systems are gaining popularity among hospital administrators, and pharmacy managers must know how to explain performance-related metrics and constructively identify their shortcomings. Unfortunately, software used for benchmarking purposes is available through a limited number of commercial vendors and unable to effectively measure departmental operations and overall performance. Through effective benchmarking, pharmacy departments should be able to identify opportunities for improving workflow efficiency, patient

Purpose. The current status of external and internal workload and productivity measurement systems and strategies to improve their use to maximize overall pharmacy department operational performance and staffing effectiveness are described.

Summary. The use of operational benchmarking is increasing within health systems as a tool for continuously measuring and improving departmental performance and evaluating departmental success. Unfortunately, software used for benchmarking purposes is available through a limited number of commercial vendors and consultants, and these systems are unable to effectively measure department operations and overall performance. The theoretical value of benchmarking and productivity measurement systems, including a description of the various definitions, tools, and data sources for comparing pharmacy productivity data, is summarized. The limitations of commercially available vendor productivity monitoring systems and desired strategies for improving their use are also reviewed. Preferred productivity and cost metrics for measuring pharmacy department effectiveness are suggested,

and strategies for obtaining value from external and internal productivity monitoring systems are explored.

Conclusion. Challenges with external operational benchmarking and internal productivity monitoring systems are numerous. These systems rarely measure the quality of pharmacy services provided and their effect on patient care outcomes and the total cost of care. Benchmarking vendors must modernize their software and develop internal checks to confirm data integrity in order to make their products more useful and reliable. In addition, data supporting the patient care role of the pharmacist should be integrated into all productivity monitoring systems and be used to demonstrate the positive impact of pharmacy services on the total cost and quality of patient care.

Index terms: Benchmarking; Computers; Economics; Patient care; Personnel, pharmacy; Pharmaceutical services; Pharmacists, hospital; Pharmacy, institutional, hospital; Productivity; Quality assurance; Work load

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care services, and financial performance, thereby improving the department's overall value to the

organization.¹⁻³ If applied ineffectively, benchmarking can lead to staffing changes that negatively

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affect the safety and quality of the medication-use process.

This article reviews the theoretical value of benchmarking and productivity monitoring systems, describes the limitations of monitoring systems available through commercial vendors, reviews strategies for meaningful peer-group selection to maximize effective external benchmarking, describes suggested key indicators and meaningful metrics for effectively monitoring pharmacy labor efficiency, and provides a step-by-step strategy for understanding and deriving value from an external productivity monitoring system as part of an overall plan to improve performance. A glossary of terms is provided in eAppendix A (available at www.ajhp.org) to assist readers in understanding the language and definitions used in this article.

Benchmarking

A simple definition of benchmarking is “finding and implementing the best practices.”^{4,5} Benchmarking was first used by the Xerox Corporation in the late 1970s. Xerox used benchmarking as a continuous process of measuring products, services, and practices against renowned industry leaders. Benchmarking allowed Xerox to improve organizational performance through the systematic identification and implementation of best practices.

While benchmarking has its virtues, it also has many limitations.⁶ Benchmarking is not informative when it is used to compare fundamentally different processes or products; rather, it works well when the process being evaluated is essentially the same across the multiple units participating in the exercise. For example, benchmarking may be useful to compare the cost of producing the same item, taking the same kind of customer order, or processing the same type of paycheck or benefit claim across multiple companies. Comparing production time or the

cost of a standard process to that of one’s peers can generate important insights about one’s efficiency only if identical services with similar outcomes are being benchmarked. Benchmarking using aggregate statistics is valid primarily for standardized processes that are intended to produce nondifferentiated services for customers.

Applications within health care.

Today’s health care executives must manage their operations more effectively than ever before, ensuring quality of care while controlling costs. The cost of care has increased, patient care settings have changed, and profit margins are shrinking. As a result, health care providers must make operational decisions to ensure appropriate resource and budget allocations, identify opportunities for financial and operational performance improvement, and quantify the return on investment of their performance-improvement initiatives. Similar to other industries, health care organizations seek to learn from relevant competitors to enhance performance and their bottom line. Mounting pressure for improved operational performance has prompted health-system administrators to turn to benchmarking vendors for assistance in determining the appropriateness of allocated departmental staffing resources. Operational benchmarking is important because it provides a starting point for identifying opportunities for cost reduction and improvement in efficiency and quality of services provided.

The term *efficiency*, when applied to health care, can be defined as avoiding waste or maximizing possible outputs from a set of resource inputs. Regardless of the definition used, health care providers have an incentive to maximize efficiency so that they can generate profit, reinvest in their business, and more fully meet their mission. Operational benchmarking provides health care admin-

istrators with a tangible means of comparing financial and operational data at the departmental and organizational levels to target key areas for cost control, performance improvement, and improved efficiency. Hospital pharmacy benchmarking data are assumed to offer a comparison of core pharmacy operations; however, today’s benchmarking systems provide little or no specific data on the efficient practices used at similar facilities, and no specific data on core pharmacy operational similarities exist.

When benchmarking is applied solely based on cost or number comparisons without considering the associated quality outcome measures, the results may become meaningless.⁶ Such comparisons have the potential to inappropriately identify cost-reducing measures and label low-quality providers as optimal performers or high-quality providers as poor performers. While the key to effective health care operational benchmarking is to draw comparisons across similar organizations and departments, this is not an easy task.

Lack of relevant literature. Few published studies have described the application of external benchmarking in health care.¹⁻³ While some authors have claimed that benchmarking in health care results in breakthrough improvements in cost control, quality, and profitability, no objective data to support these claims have been published. In health care, benchmarking is often perceived as a time- and resource-consuming venture, and health care literature has not provided any evidence that operational benchmarking results in desired organizational improvements. The inability to effectively measure workload and productivity has been a long-standing problem for health-system pharmacists. No gold standard for measuring health-system pharmacy productivity has been published; this is true for internal productivity monitoring and for

external operational benchmarking purposes. While efforts to identify systems to measure pharmacy productivity and staffing requirements have been described in the literature since the 1960s, a standardized productivity monitoring system has not been widely adopted across the profession. Many pharmacy productivity workload ratios have been published, but most are based on simple labor efficiency metrics that are tied to orders processed, doses billed for, and full-time equivalents (FTEs) utilized per discharge.⁷⁻¹² In most cases, clinical activities are not included. To date, productivity monitoring articles in the pharmacy and health care literature have not emphasized activities related to pharmacist-provided patient care services or developing a pharmacy workload monitoring system that analyzes the effect of pharmacy services on overall patient outcomes, cost to the hospital, and quality of care. Likewise, limited data exist to assist pharmacy directors in understanding the advantages and disadvantages of various hospital pharmacy workload and productivity monitoring metrics and systems.

A search of the pharmacy literature revealed very little on external benchmarking. While more data exist in the pharmacy literature on internal benchmarking, literature describing the effective use of such systems is limited and dated.¹³⁻²⁰ A few published articles have described benchmarking applications for use in health-system pharmacies.^{7,8,10,12,21} In general, these reports described methods for developing a comprehensive picture of the daily activities of clinical pharmacists and technicians. In 2000, Murphy⁸ noted that benchmarking can help pharmacists understand the value and outcomes of their efforts and their colleagues' efforts and convince health care administrators of the value of pharmacy services. Yet Knoer et al.⁷ cautioned managers to be careful when

reporting, interpreting, and using benchmarking data.

Benchmarking may be an effective tool for monitoring external labor productivity; however, evidence-based literature supporting its use for this purpose is limited. The perceived value of benchmarking noted in the pharmacy literature is that it can

- Determine the value and effectiveness of pharmacy services,
- Provide an effective management tool for quantifying how much time is spent on various types of cognitive work,
- Provide a comparison with similar institutions to identify problems and establish appropriate attainable goals,
- Show health-system administrators the value of pharmacy services,
- Identify opportunities to reduce costs,
- Enable assessment of initiatives by comparing their effectiveness with similar efforts of similar institutions,
- Quantify the potential range of performance-improvement opportunity compared with that of peers, and
- Determine the appropriate next steps toward achieving cost-reduction targets, including labor expenses, supply expenses, and service utilization improvement.

While the above theoretical values are noble, external benchmarking is rarely used by consultants and commercial vendors for such purposes.⁹

Current benchmarking and productivity monitoring systems

The goal of external benchmarking in health care is to find and implement the best practices of peer organizations.^{22,23} While it is possible to identify variation in performance across a group of peers through external benchmarking and to identify targeted opportunities to improve efficiency and cost management, today's external benchmarking systems present many significant challenges.

Despite the fact that hospital pharmacy productivity monitoring is fraught with limitations and that pharmacy services vary considerably across institutions, commercial vendors and consultants without expertise in defining and measuring successful pharmacy practice often sell benchmarking metrics and packages that ultimately result in the downsizing of pharmacy departments and services. Productivity targets set by external benchmarking vendors and consultants usually conflict with the pharmacy department's goal of expanding clinical services and implementing best practices. Today's commercially available systems are not reflective of current health-system pharmacy practice and often leave much to be desired by focusing solely on medication doses dispensed or orders processed (widgets produced, not quality). These systems do not measure the total cost of care and associations with individual department costs and services, nor do they measure patient outcomes. A full understanding of quality and safety issues, combined with a broad assessment of differences in programs and other variables, makes meaningful operational benchmarking a tremendous challenge.

With productivity monitoring systems gaining popularity in hospitals, pharmacy managers must often explain metrics related to department performance and identify the pitfalls of benchmarking systems. Unfortunately, more time is often spent trying to explain why the systems do not work well rather than focusing on using them effectively. Despite the problems identified above, it is common for operational benchmarking consulting firms to assess pharmacy productivity and value by comparing staffing or workload ratios based solely on measures of product distribution. These ratios rarely measure the pharmacists' workload or performance in patient care activities and never assess the

overall effect of pharmacy services on patient outcomes and the total cost of care. These excessively rigid and overly casual assessments of cost and labor create significant problems in reported metrics. For instance, consulting vendors and hospital administrators often recommend or mandate reductions in pharmacy staffing to meet targeted cost ratios. Labor costs do not provide a good measure of overall pharmacy performance, as pharmacy is a unique hospital department often with <20% of total department costs related to personnel (compared with 60% in other departments) and >80% of total department costs related to medications and supplies. An inversely proportional relationship often exists between pharmacy labor costs and drug expenditures. For instance, reductions in pharmacy labor costs and a reduction or the elimination of clinical pharmacy services may ultimately result in higher hospital drug expenditures, higher overall hospital costs, and higher rates of medication errors and preventable adverse drug events.

Hospital pharmacy directors are often put in a position to defend against claims of consulting benchmarking organizations. Most do this without having systems in place to demonstrate the positive value of their current services on the overall quality and cost of care. The lack of a national system for monitoring pharmacy productivity and the inability of monitoring systems to account for clinical services performed by staff to measure the overall value of pharmacy services in patient care make it impossible for pharmacy directors to effectively refute consulting vendors' claims—based on assessment of limited pharmacy production data—to reduce pharmacy staffing levels.

Although hospital pharmacy directors are facing an increased demand for clinical pharmacy services, pharmacy workload, calculated based on doses dispensed or medication

orders received, is also increased. However, production-related productivity statistics do not always correlate with clinical activity needs, yet benchmarking consultants insist on determining pharmacy staffing ratios based on widget production trends rather than the need for effective clinical pharmacy practice.

Recommendations for producing meaningful measures that differentiate overall value derived from a defined investment are absent in health care and pharmacy benchmarking literature. The value obtained from an investment in pharmacy services does not have a validated definition or measurement guideline. With the rising costs of pharmaceuticals in hospitals, changes to prospective reimbursement, and shifts from the provision of complicated care from the inpatient to ambulatory care setting, the same legacy commercial and consultant benchmarking systems that survived the business consolidations of the 1990s and early 2000s are no longer effective. The movement to a more knowledge- and outcome-based assessment of the impact of pharmacy services has complicated the development and use of workload and productivity measures in the pharmacy profession.²⁴ Today's productivity and operational benchmarking systems lack a robust measure of quality of care outcomes and may be replaced by balanced scorecards or "dashboards" that incorporate indicators of quality into efficiency and effectiveness measures.

External benchmarking systems and their limitations

Data elements include operating statistics (e.g., drug expenses, labor expenses, orders processed, medication doses administered, supply expenses), facility information (e.g., numbers of patients admitted and discharged, case-mix index [CMI], number of clinic visits, pharmacy intensity scores), and staffing con-

figurations (e.g., paid FTEs; percentages of pharmacists, technicians, and managers; overtime hours). Data are reported from several areas of the organization, including the general ledger (e.g., supply expenses), payroll system (e.g., paid hours, worked hours), charge master (e.g., procedure and other workload volumes), monthly financial reports (e.g., revenues), manual statistics supplied from departments (e.g., orders processed), and billing and coding data (e.g., revenues).

As mentioned previously, commercially available operational benchmarking systems used to monitor pharmacy labor efficiency and financial performance are fraught with limitations and challenges. Benchmarking software and consulting vendors have an obligation to improve their systems so that they do not provide an inaccurate assessment of staff performance (i.e., make top quality performers appear as poor performers and vice versa). Understanding the current limitations of these systems will assist users in identifying and explaining such inaccurate assessments, should they occur. Numerous such limitations have been identified and are described below.

Department definitions and breakouts do not allow for data to be submitted in a manner that enables meaningful comparisons. In many vendor and consultant benchmarking software systems, all hospital drug expenses, pharmacy labor expenses, and statistics are reported as a single department's data within the software. Thus, the hospital's inpatient drug expenses are combined into a single database along with drug expenses from hospital clinics, oncology and nononcology infusion centers, the emergency department, dialysis centers, procedure areas, perioperative care areas, and, sometimes, retail pharmacies. Historically, when most hospital drug expenses were incurred in the inpatient setting, such

reporting made sense. However, outpatient drug expenses are increasing by up to 25% per year in many hospitals,²⁵ and pharmacy departments with large infusion centers and high-cost procedure areas are negatively affected when these drug expenses are lumped in with inpatient department expenses. Since inpatient drug expenses are not reported “purely” in a separate department, estimating inpatient drug costs requires the use of a flawed revenue adjustment factor to approximate inpatient costs. A revenue adjustment factor is based on the ratio of total inpatient and clinic pharmacy charges to total inpatient pharmacy charges. It is a flawed attempt to approximate inpatient drug expenses. Revenue adjustment factors have been routinely used for reporting pharmacy benchmarking metrics, because most pharmacy departments have traditionally not used systems that separate inpatient drug expenses from all other hospital drug expenses. This confusion results in inaccurate reporting by many customers and thus flawed productivity and cost reports.

It is important to understand how the revenue adjustment factor is used to approximate inpatient expense. For example, a commonly reported benchmarking cost ratio performance metric is “inpatient drug expense per 100 CMI-adjusted revenue-adjusted patient day.” The mathematical formula for this is as follows:

$$\frac{\text{inpatient drug expense} + \text{all ambulatory drug expense}}{\text{hospital CMI score} \times 100} \times \frac{\text{pharmacy department inpatient and outpatient gross revenue}}{\text{pharmacy department inpatient revenue}} \times \text{patient days}$$

While vendors may insist that the above calculation provides a meaningful performance indicator for inpatient pharmacy drug expense by approximating inpatient drug expense through the revenue adjustment factor, the result is very misleading for two reasons. First,

the reported drug expense calculated from the above formula may include extensive noninpatient drug expenses. In many large hospitals, inpatient drug expenses represent <50% of the total reported expenses, so it is hardly fair to call this an inpatient expense ratio. Second, the revenue adjustment factor, which incorporates total pharmacy inpatient and noninpatient revenue, can skew the data because of the following reasons:

1. Despite being in conflict with current Medicare regulations, some hospitals have a higher outpatient drug revenue formula markup than their inpatient markup. This leads to an artificial improvement in their inpatient drug expense performance compared with those institutions that have a consistent markup formula across their inpatient and outpatient settings.
2. There is tremendous variability in pricing markups and fees among various hospitals.
3. While outpatient drug expenses are often included with inpatient drug expenses in vendor-reported metrics, there is currently no outpatient acuity adjustment factor for adjusting these data. Thus, pharmacy departments with large ambulatory care infusion centers, dialysis centers, and oncology clinics may be severely disadvantaged. In some hospitals, many ambulatory care areas (infusion and dialysis centers) have a very low number of patients and drug doses that comprise a disproportionately high share of reported drug expenses and gross revenue, resulting in unfair comparisons with organizations that may not provide similar outpatient services.
4. Many top performers in commercially available vendor and consultant reports inaccurately include their retail pharmacy and oncology clinic rev-

enue in the gross revenue equation and do not include their retail pharmacy or oncology clinic drug expenses in the drug expense equation. This approach dramatically affects their revenue adjustment factor calculation and makes them appear to be much better performers compared with others who report their data accurately.

5. There is tremendous inconsistency among hospitals regarding the inclusion of outpatient drug expenses from all clinics and procedure areas in their inpatient drug expenses according to vendor instructions (e.g., many top pharmacy performers do not report clinic drug expenses according to reporting instructions).
6. In some hospitals, physician practices purchase all ambulatory drugs and obtain the revenues for this drug use; thus, these hospitals have very minimal ambulatory drug expense to report.
7. Many vendors’ instructions are vague regarding which drug expenses and revenues to include in the reported inpatient drug expenses; thus, many hospitals unknowingly and inaccurately report both drug and labor expenses.

These same factors could apply to labor productivity ratios whose calculation requires the use of a revenue adjustment factor.

There is tremendous variability in the extent to which pharmacy departments provide distributive and clinical pharmacy services in emergency departments and ambulatory care clinics. Departments that provide a higher level of outpatient clinical pharmacy services (e.g., anticoagulation clinics, pharmacist-managed clinics of any sort) have a tremendous disadvantage in terms of reported productivity ratios and labor expenses compared with supposed peer departments that do not provide these services if they are required to include clinic worked hours and labor expenses into their inpatient expenses. In fact, departments

that do or do not provide outpatient clinical pharmacist services could be disadvantaged when compared with each other. In the following hypothetical case, two “like” hospitals (A and B) are benchmarked using a vendor system that combines inpatient and outpatient drug and labor expenses into a single department.

Hospital A has \$500,000 in clinic drug costs. Most of these costs are incurred by a physician group practice with a \$14.5 million drug expense budget, and those physicians receive all revenues from that purchase. Hospital A also has \$1.3 million in pharmacist labor expenses. Hospital B has \$15 million in clinic drug expenses, and the hospital owns this expense and revenue. Both hospitals have 80 clinics and 30 FTE inpatient clinical pharmacists. But while hospital B has 0 FTE pharmacists in clinics, 10 FTE clinical pharmacists (paid by the hospital) provide outpatient clinical services in hospital A’s clinics due to a physician shortage.

After analyzing the data above, hospital B’s chief executive officer (CEO) asks the hospital’s director of pharmacy the following: “Why aren’t our pharmacists doing as good of a job at controlling inpatient drug expense as hospital A’s pharmacists? Reduce your inpatient drug expense by \$14.5 million in the next year so we can perform as well as hospital A.”

In contrast, hospital A’s CEO conveys the following message to the director of pharmacy: “The inpatient pharmacy must become more labor efficient. Reduce your inpatient pharmacy by 10 pharmacist FTEs in the next year so we can manage our inpatient pharmacy labor expense as well as hospital B does.”

For most hospital pharmacies, separation of noninpatient (e.g., clinic, emergency department, infusion center, procedure area, outpatient surgery, cardiac catheterization laboratory, outpatient dialysis) drug expenses from inpatient pharmacy

drug expenses is absolutely necessary in order for reported pharmacy “inpatient” operational benchmarking data to be considered meaningful and accurate. Reporting only inpatient drug expenses eliminates the need for a revenue adjustment factor altogether when calculating inpatient labor- and cost-efficiency metrics or ratios, which are also necessary for meaningful and accurate reporting. Pharmacy departments must first develop systems for accurately segregating inpatient drug expenses from all other drug expenses throughout the organization. In addition, vendors and consultants must develop software systems that enable noninpatient drug expenses and retail pharmacy drug expenses to be reported separately from those of the inpatient pharmacy department. Operational benchmarking software systems should develop separate reporting departments for inpatient pharmacies, outpatient clinics, retail pharmacies (including all take-home prescription medications), and other pharmacy services (services that do not fit into the above departments, such as pharmacy administration and drug policy and research services, but include all normalized drug expenses) to allow for the segregation of reported pharmacy statistics.

Characteristic survey questions used by external vendors do not reflect current best practices in health-system pharmacy and do not assist customers with easy identification of meaningful peer groups.

The real cause of differences shown in key indicator ratios may result from factors outside the scope of data elements reported into the system. Pharmacists and pharmacy departments provide services that range from the distribution and logistics of pharmaceutical products to the provision of advanced direct patient care services. The sheer number of differing services provided within a given department makes accurate reporting and measurement difficult,

and the vast difference among services provided by various pharmacy departments makes meaningful comparisons almost impossible.

A major issue related to effective benchmarking is the selection of an appropriate peer group for assessing workflow and productivity. The questionnaires (e.g., characteristic surveys) used by external vendors to compare hospitals rarely include enough detail to capture the wide variations in work practices of health-system pharmacies; thus, they are rarely useful for identifying true peers. Characteristic questions developed by vendors are often a series of yes or no questions about whether a pharmacy department provides a specific service, without regard for the extent of service implementation and the extent to which it follows best practice standards. Such questions are of limited value in determining one’s peer organizations. For example, when answering the question “Do you provide pharmacist medication admission histories for inpatients?”, a department that has 0.2 FTE pharmacist providing this service on just 1 of 20 inpatient units may respond “yes,” as would a department that provides this service with 3.5 FTE pharmacists on all 20 inpatient units. These two departments would appear to be peers in the characteristic survey, yet in reality these two departments provide very different levels of pharmacist patient care services. The degree to which pharmacists are involved in the clinical care of patients varies widely among hospitals, as does the level of adoption of various technologies, such as computerized prescriber-order-entry and bar-code-assisted medication administration systems. Yet today’s characteristic questions are rarely effective in distinguishing among the levels of services that are truly provided across organizations. In addition to being vague and misleading, characteristic questions are often not modernized to measure

the extent to which best practices for reducing medication expenses and maximizing patient medication-use safety have been implemented within each organization.

Vendor-developed characteristic questions should reflect current best practices in order to help customers more easily identify a meaningful peer group. An ideal characteristic survey will adequately measure demographic information about the pharmacy department and the extent to which best practices have been implemented for controlling medication expense and ensuring high-quality medication-use outcomes. An example of an ideal survey can be viewed at www.ashp.org/peersurvey. This survey was developed by the ASHP Section Advisory Group on Workload and Productivity Monitoring to identify health systems that can serve as true peers. Using such a survey will allow a health system to compare itself to organizations that offer services of similar scope and intensity. Commercial benchmarking vendors and consultant groups would be wise to consider using such a survey. In the meantime, pharmacy directors should select a limited number of peers (e.g., 10–25) to learn how their data are derived and whether they are truly comparable.

Drug expenses are not reported in or separated into meaningful groups with clear definitions. With today's commercially available systems, drug expenses are usually not reported using appropriate drug expense classification categories. Thus, it is very difficult to efficiently identify differences in specific medication class expenses from the host site versus the peer comparator group of institutions. A single type of patient (and his or her associated class of medication expenses) can dramatically change the reported cost performance between two otherwise similar pharmacies. For example, a hospital that performs many solid organ transplantations incurs very

different drug costs versus a hospital that performs none. The same is true for a hospital that cared for a patient with hemophilia who received \$1 million worth of clotting factors over a two-week period versus another hospital that did not provide care for a hemophilic patient in the reported time frame.

Drug expenses should be broken down into meaningful groupings with clear definitions to incorporate areas of major drug expenses. Some examples of drug classes that should have their reported expenses clearly separated from total drug expenses to facilitate better peer-group comparisons include transplantation medications, anti-infective agents, chemotherapy, blood factors, blood and immune system modifiers, i.v. immune globulin, and albumin. An "ideal" vendor drug expense benchmarking report is provided in eAppendix B (available at www.ajhp.org). Comparing drug expenses based on patients' diagnosis-related groups (DRGs) would also be useful for separating drug expenses.

The CMI is routinely used to approximate patient acuity but is a flawed method for measuring pharmacy-specific patient acuity. Differences in patient acuity (i.e., severity of illness) greatly confound operational benchmarking today. An acuity adjustment factor is ideal in that it will enable direct comparison among institutions, regardless of patient mix. However, there exists a lack of consideration of patient acuity in many workload measurement systems, as well as a lack of accurate acuity adjustment in most operational benchmarking systems. Many systems use the Centers for Medicare and Medicaid Services (CMS) CMI to determine an acuity adjustment factor. However, the CMI currently used by CMS is not based on outcomes but rather on poorly defined levels of overall hospital resource consumption necessary to treat a patient. It assumes that all patients

have the same outcome. While CMS's CMI may be accurate from an overall hospital resource consumption perspective in terms of adjusting for patient acuity, it does not work well for pharmacy department comparisons because it assigns similar acuity ratings to patients who require vastly different levels of medication resources and patient care services to achieve a positive outcome. Thus, using the CMI to adjust for patient acuity may erroneously identify poor pharmacy department performers as benchmarks and good performers as deficient.

In the absence of adequate acuity adjustment via the CMI, the department of pharmacy at the University of Wisconsin Hospital and Clinics developed an improved adjustment strategy called the pharmacy intensity score. This scoring system was first endorsed and adopted by the University HealthSystem Consortium and has been adopted and implemented by the nation's largest commercial vendor of external pharmacy operational benchmarking software. Other vendors are also working on similar scoring systems. The pharmacy intensity score is a resource-based, relative value intensity grouping system that uses pharmaceutical resource consumption data to produce DRG-specific drug-use requirements (weights). It is strongly suggested that pharmacy departments use the pharmacy intensity score rather than the CMI as their preferred strategy for weighting key indicator metrics for both labor and cost.

Two DRGs with the identical CMI may have pharmacy intensity scores that vary by threefold. For example, patients undergoing hip replacement or kidney transplantation procedures have the same CMI (3.2), which is 17.1% of the highest CMI DRG (using 2004 data). However, hip replacement has a pharmacy intensity score of 7.8, while kidney transplantation has a pharmacy intensity score of 27.5. This example is meaningful,

as no one will argue that a patient undergoing a hip replacement procedure requires the same level of drug therapy monitoring as does a kidney transplant recipient, nor would anyone argue that the drug cost per admission for an average hip replacement would approximate that of kidney transplantation. However, the use of the CMI as a weighting tool would apply equal intensity (acuity) to patients with these two DRGs. Thus, if the CMI weighting method is used, a hospital in which many hip replacement procedures are performed and no kidney transplantation is performed could look similar in intensity relative to a peer hospital that performs many kidney transplantations and no hip replacement procedures. Another good example is bone marrow transplantation. The CMI for this procedure is approximately 35% of the highest CMI; yet, the pharmacy intensity score is the highest of all DRGs.

Clinical activity (workload performance) measures are ambiguous, are unclear, and lack meaning. Over the past 20 years, the patient care role of the pharmacist has dramatically expanded to include activities that ensure optimal outcomes are achieved through the use of medications. These activities include performance of medication admission histories, medication reconciliation, participation in patient care rounds, dosing of complex medication regimens, patient teaching, and drug therapy monitoring. Many of these clinical patient care services provided by pharmacists are not routinely recorded or are not captured in information management systems, and manual collection of such data is often inefficient, error-prone, and impractical. Also, the intensity of services provided often varies on a case-by-case or department-by-department basis, making standardized relative work unit assignment very challenging and inaccurate. Many pharmacy departments do

not have efficient systems for logging clinical activities or the time involved in performing each activity. Some computerized systems for documenting clinical interventions are time-consuming, and most lack appropriate workload weighting systems for competing clinical interventions (e.g., answering a simple drug information question can receive the same weight as dosing a chemotherapy regimen). Despite the inability to accurately measure the extent to which these activities occur, the literature is replete with examples demonstrating how the clinical role of the pharmacist results in dramatic improvements in patient safety and decreased total costs of care.²⁶⁻²⁸ Today's commercially available benchmarking systems do not effectively capture clinical activity or the extent of clinical activity. In addition, there is a great deal of variability in how people report clinical services, and this needs to be standardized in the future. Pharmacy departments with the most extensive implementation of best clinical practices may appear to be the least efficient (high-cost) performers when evaluating labor hours worked and labor cost metrics within benchmarking systems, yet their total pharmacy department expense metrics (labor plus drug expenses) may be among the most efficient.

Some benchmarking vendors instruct pharmacy departments to report clinical service workload units in 15-minute increments. However, algorithms to assess the financial impact of such interventions are often not included in vendor-driven benchmarking systems. Although clinical service workload units are somewhat meaningless, there is no evidence-based mechanism to capture clinical activity. Due to hospital administrators' lack of understanding of clinical pharmacy, pharmacy directors must convince hospital administration of the value of pharmacy, and clinical pharmacy activity

must be captured to prove that pharmacists make a difference in overall outcomes and costs. Categories and intervention types vary dramatically across pharmacy departments (e.g., i.v.-to-oral conversion programs, dosage adjustments for renal or hepatic impairment, drug information, order clarification), yet this is nearly impossible to capture in a voluntary reporting environment. In addition, reporting clinical service workload does not provide any level of certainty that pharmacist recommendations are accepted and implemented to improve patient care.

Due to the lack of consensus on meaningful clinical workload data elements and the inability to accurately and consistently have these data voluntarily reported by pharmacists in all organizations, the reporting of clinical workload measures should be left as optional in vendor software systems. Clinical workload outcome metrics should not be required or used to draw any conclusions about pharmacy department performance. These data should be collected and monitored internally for trends over time as one component of pharmacy department performance.

Normalizations (i.e., adjustments of reported costs from one department to another) are not applied consistently across hospitals and often lack meaning. If all drugs are not purchased by the pharmacy department, it is very difficult to measure true pharmacy department effectiveness. Drug expenses for items such as radiological contrast media, volatile anesthetic gases, blood factors, i.v. immune globulin, and albumin are highly variable from hospital to hospital and year to year and may be driven by a very low number of patients. Commercial benchmarking systems often do not correlate the reported drug expenses with the characteristic of the service provided. They also do not reallocate the drug expense to its affiliated department consistently across the en-

tire database of participants. Efforts to correlate these factors to maximize consistency of comparative groups need to be instituted. This is especially true for the agents listed above. In some hospitals, departments other than pharmacy may be responsible for purchasing one or more of these products. Without a method to consistently transfer the expense of drugs purchased in a nonpharmacy department to the pharmacy department, the pharmacy department that can shift the purchasing of these drugs to other departments will appear to be a better performer in benchmarking cost metric ratios.

At a minimum, all radiological contrast media, volatile anesthetic gases, blood factors, i.v. immune globulin, and albumin expenses within the entire organization should be normalized consistently to a defined department. It is acceptable to normalize them to the inpatient pharmacy department if this normalization can be ensured by all organizations reporting data into the system. Otherwise, these products should be normalized to an “other” pharmacy department. Vendors must consistently apply department cost transfer (normalization) schemes for these products. Ideally, normalization should occur for all products listed in eAppendix B. Systems must be in place to ensure that this happens for every participating client who reports pharmacy data in the system.

Reporting of pharmaceutical manufacturer rebates and expired drug credits is not applied consistently across hospitals. Most hospitals receive credit payments based on pharmaceutical manufacturer contract rebates and expired-drug returns. In fact, such rebates can amount to 5% of a hospital’s total medication expenses. However, all hospitals do not handle the processing of these credits consistently. While most organizations apply these credits against the reported phar-

macy drug expenses in the operating statement when the check is received (this lowers reported drug expenses), some hospitals never allow these credits to be applied as savings to the pharmacy department. Hospitals that do not credit the savings back to the pharmacy have an inherent disadvantage when comparing their drug cost and total cost metrics to peers who do apply these credits back to the pharmacy department.

Vendors must be certain to consistently ensure that any purchasing rebate and expired-drug credits (checks) received by the hospital or pharmacy department are offset against the organization’s reported drug expenses, regardless of how these credits are reported on the organization’s operation statement.

Disproportionate-share contract (340B) participation is not readily flagged in vendor systems. Hospitals eligible for 340B contracts have 20–35% lower drug costs than noneligible organizations. Thus, non-340B pharmacy departments are at a tremendous disadvantage when benchmarked via drug cost performance metrics against hospitals that are 340B participants. This is especially true in vendor systems that combine inpatient and outpatient drug expenses into a single department.

Pharmacy departments that are not 340B participants should not be benchmarked via drug cost performance metrics against departments that are 340B participants.

Instructions for data reporting provided by vendors are unclear and often are not fully understood by hospital data coordinators and pharmacy directors. Descriptions of data elements are often vague, resulting in inaccurate reporting by hospital data coordinators, who frequently report these data on behalf of the pharmacy department. Some elements are required, while others are optional, depending on the vendor or consultant. The lack of clear reporting instructions may also lead

to intentional “gaming” of reported data by pharmacy directors who have figured out how to “fly under the radar” and report their data in a manner that makes their performance appear better than it actually is. In addition, ratio and key indicator metric outputs are often unclear and archaic.

To remedy this problem, all reported data elements must be clearly defined and readily measurable, and submission status must be clearly defined as being required or optional. Vendor instructions for reporting required and optional expense and statistical data elements must clearly explain how and where to report the data. Both pharmacist and nonpharmacist data coordinators must be able to consistently understand and apply these measures and instructions. Available cost and labor productivity ratios (e.g., key indicator ratios) that are reported as system outputs must be clearly defined and not abbreviated, and these definitions must be transparent to the pharmacy department. All definitions of metrics should be accompanied by the mathematical formula used to derive each metric and by the number and names of organizations included in the comparative peer group. These system enhancements would improve the accuracy, consistency, and value of benchmarking data reporting across all participating hospitals.

Many vendors do not have a process in place for appropriate quality assurance of reported data. For example, vendors may report that a pharmacy department’s total inpatient drug expenses are greater than the hospital’s total drug expenses. Or vendors will allow an organization to report clinical workload as the total number of scheduled minutes worked by its pharmacists. They do so without considering that some organizations fail to report all drug expenses into the inpatient department per the reporting instructions or that some submit pharmacy rev-

enue from an area of the department without reporting the associated drug expenses. If not caught and factored out of peer-group comparison data, these flaws in data reporting can result in poor performers appearing as the best in their class.

Benchmarking vendors must develop internal checks of data reliability and integrity to identify problems before they report data to contracted organizations. Grossly inaccurate data must be factored out of peer-group comparisons.

Vendor-reported labor- and cost-productivity ratios and suggested key performance indicators are flawed and often used inappropriately within organizations. There is a vast array of productivity measures that are commonly used when evaluating pharmacy services (Table 1).

There is a significant disadvantage to using productivity measures that are based on doses charged or dispensed, because these do not measure the full range of pharmacists' activities and their related patient outcomes. Using doses dispensed in the denominator (e.g., hours worked per dose dispensed) of a labor or cost ratio is flawed, as there are considerable differences in labor requirements of an organization with pure unit-dose-dispensing operations versus an organization that stocks commercially available manufacturer-sized products in automated dispensing systems regardless of patient need. These ratios can also be altered by the pharmacy computer system counting the doses. For example, some pharmacy software systems report each unit of insulin as a dose administered. Such a system would report a single 10-unit dose of insulin as 10 doses, whereas another hospital's software system would appropriately report that same dose as a single dose. In this case, the former department could appear to be 10 times more productive when dispensing all medications dosed in "units." Such inconsistencies in counting medica-

Table 1. Examples of Frequently Used Pharmacy Productivity Ratios ^a	
Examples of Labor Productivity Ratios	Examples of Cost-Based Productivity Ratios
Hours worked per adjusted patient day <i>(hours worked per 100 CMI-weighted revenue-adjusted patient days, hours worked per 100 pharmacy-intensity-score-weighted patient days)</i>	Drug cost per adjusted patient day
Hours worked per adjusted discharge	Labor cost per adjusted patient day
Hours worked (paid) per 100 orders processed	Total pharmacy cost per adjusted patient day
Hours worked per 100 admissions	Drug cost per adjusted discharge ^b
Hours paid per adjusted patient day	Labor cost per adjusted discharge
Hours paid per adjusted discharge	Total pharmacy cost per adjusted discharge ^b
Hours worked per patient day	Drug cost per 100 orders processed
FTEs per dose billed	Labor cost per 100 orders processed
FTEs per order processed	Total pharmacy cost per 100 orders processed
FTEs per occupied bed	...
FTEs per adjusted patient day	...

^aOften, productivity ratios are weighted for acuity using the case-mix index (CMI) and adjusted using a pharmacy revenue factor adjustment when noninpatient expenses are included in the inpatient department. Such weighting may occur for any productivity ratio. An example of these weightings is included for demonstration purposes in italics with the first labor productivity ratio in this table. FTEs = full-time equivalents.

^bPreferred metrics.

tion doses may render this information practically useless.

Using productivity measures based on patient days (e.g., hours worked per patient day) in the denominator of a labor or cost ratio is also not ideal for several reasons. First, most drug expenses and pharmacist labor requirements are associated with the first half of a patient's admission to the hospital. Second, patient days is a variable that is often associated with how well a hospital is managing its capacity. If a hospital is not performing well in this area, the pharmacy's performance on ratios using patient days in the denominator will be artificially inflated. As the organization works to improve capacity management, patient length of stay will be reduced and reductions in patient days may follow. As patient days are reduced, drug costs will likely not be proportionately reduced, since most drug expense occurs during the first few days of admission. Thus, using

patient days could make the department's productivity ratio appear worse over time because the denominator (patient days) will be reduced to a greater extent than department cost, which is usually expressed in the numerator of the ratio. If a hospital does not manage the discharge process well, the pharmacy department may benchmark better against its peers if it chooses to report metrics using a per-patient-day indicator. Likewise, if a hospital converts its temporary or observational patients to true inpatients, patient-day counts may increase and result in a more-favorable comparison against pharmacy department peers. Often times, calculating a specific cost or labor productivity metric using patient days versus admissions in the denominator can increase or decrease a department's reported percentile performance by up to 10%.

Evaluating pharmacy productivity by using ratios that include order

volume in the denominator can also be troublesome. While order volume is certainly more indicative of pharmacy workload than doses dispensed, the number of medication orders that can be processed by pharmacists per hour depends largely on the computer system they are using for order entry. Some systems are more robust and easier to use than others. In many cases, simply having a different computer system can render two departments impossible to compare with one another.

Some external benchmarking systems offer a limited number of key indicator performance metrics. For example, some offer CMI acuity adjustments but not a pharmacy intensity scoring system. Some offer key indicators in terms of doses dispensed or patient days and produce labor cost metric reports without corresponding drug cost and total pharmacy cost metrics. Often times, due to the effectiveness of clinical pharmacy services, departments that appear to be poor performers in labor metrics are often the top performers in drug and total cost metrics. Excessively rigid or overly casual use of productivity and cost ratio benchmarks can create significant problems for pharmacy directors.

More meaningful productivity and cost ratios must be included in benchmarking systems offered by vendors and consultants, and pharmacy directors must have access to view the results for all available metrics. In addition, the pharmacy department should be able to evaluate every reported labor and cost ratio based on the CMI and pharmacy intensity score, which is thought to be a more meaningful weighting method than the CMI. Ideally, future benchmarking systems will be able to separate inpatient drug expenses from all other hospital drug expenses, and revenue adjustment factors could be eliminated from reported ratios altogether.

Suggested metrics to evaluate labor efficiency include worked hours

per 100 orders, worked hours per pharmacy intensity weighted discharge, and pharmacy labor expense per pharmacy intensity weighted discharge. In addition, some suggested metrics to evaluate cost efficiency include drug expense per pharmacy intensity weighted discharge and total pharmacy expense per pharmacy intensity weighted discharge.

It is also important to recognize that clinical pharmacists are very effective at reducing drug expenses, often reducing drug expenses by more than three times their cost.²⁶⁻²⁸ In hospital pharmacy departments, drug costs often comprise 80–90% of total expenses while personnel represent as low as 10–20% of total departmental expenses. Therefore, labor efficiency metrics should never be reported in the absence of meaningful cost performance metrics, and pharmacy directors should insist on this if provided with only labor metrics from consultants or if asked to include a labor metric in the department's budgeting process. The following example demonstrates this limitation.

A consultant is evaluating hospital A versus peer hospital B in terms of labor productivity ratios only, not cost ratios. Hours worked per 100 doses dispensed has been selected as the desired labor productivity ratio for measuring pharmacy staffing effectiveness. Hospital A staffs the pharmacy with 400 worked hours per day, 40% pharmacist staffing (160 pharmacist hours per day) and 60% technician staffing (240 technician hours per day), which amounts to a total pharmacy salary cost of \$3100 per day. Hospital B staffs the pharmacy with 400 worked hours per day, 90% pharmacist staffing (360 pharmacist hours per day) and 10% technician staffing (40 technician hours per day), which amounts to a total pharmacy salary cost of \$5100 per day.

According to the above example, using only a productivity ratio met-

ric of hours worked per 100 doses as the measure of efficiency, hospitals A and B will look identical in terms of pharmacy productivity. However, if the cost ratio of labor cost per hour is used, there would be substantial differences, with hospital A being the much better performer.

Ideally, both labor and drug cost ratios should have been evaluated. Many hospitals that are top performers in labor cost ratios may be poor performers in total pharmacy cost ratios if they do not have pharmacists positioned properly to ensure that cost-effective drug therapy decisions are made. Thus, a hospital that performs at the 80th percentile in labor cost ratios may benchmark at the 20th percentile in terms of drug cost ratios and the 30th percentile in terms of total pharmacy cost ratios, because its use of pharmacists is more effective for lowering drug costs. Pharmacy directors should be included in the process of determining which core labor productivity and cost metrics are most applicable and useful in determining the overall effectiveness of their department. Pharmacy directors should also be given the opportunity to confirm the accuracy of reported data elements, selected peer groups, and mathematical formulas used by consultants to derive key indicator ratios for both their organization's results and the results of peer organizations.

Though many variations exist in productivity monitoring, directors should advocate for the use of measuring pharmacy performance "per admission" rather than "per patient day." At the same time, directors should recognize that while the per-admission metric is better, because most intensive drug use occurs in the first few days of an admission, there is still much ambiguity as to the range of acceptable pharmacy cost per admission. Consultants will report that an acceptable range for pharmacy drug cost per admission is

from \$50 to \$800, depending on the database they are using to provide their reports.

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