

Decision-making framework for an acute care clinical pharmacist productivity model: Part

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Purpose. Clinical pharmacist productivity assessment has long been challenging, as a standard definition does not exist. A multistep project was undertaken with the intent to develop, validate, and implement an acute care clinical pharmacist productivity model. The initial step of the project was designed to identify, define, prioritize, and weight a comprehensive list of daily pharmacist responsibilities stratified by relative time spent on each function via consensus.

Methods. Delphi methodology applied by a panel of experts was used to identify a comprehensive list of acute care pharmacist responsibilities ranked in order of time intensity. Twenty-three acute care clinical pharmacists participated in the process. The consensus list was validated by time observation studies. Each responsibility was assigned a weight and corresponding work outputs by a consensus panel. Weighting of each responsibility was assigned according to the relative time intensity and complexity of each task.

Results. The results of the Delphi consensus process included the top 20 time-intensive responsibilities identified by the acute care clinical pharmacists. Timed observations of acute care clinical pharmacists yielded results similar to those of the consensus process. Selection of corresponding work outputs and weights for each responsibility provided the final requirements for the productivity model.

Conclusion. The development of an acute care clinical pharmacist productivity model first requires the selection of appropriate work outputs and weighting. The consensus process provided a newly identified comprehensive list of pharmacist responsibilities that will serve as the foundation of the clinical productivity model. Validated consensus methodology can be useful for engaging clinical pharmacists in decision-making and the development of a clinical productivity model.

Keywords: benchmarking, clinical pharmacist, consensus, metrics, productivity, practice model

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As overall healthcare costs continue to rise, pharmacy departments face increased scrutiny over their annual budgets. While medication costs are a primary focus, labor costs, particularly for pharmacists, are routinely evaluated. Simultaneously, the role of clinical pharmacists continues to broaden in order to optimize medication use and improve patient outcomes.¹⁻⁴ The evolving role of pharmacists in health systems has made historical methods of productivity measurement either obsolete or inaccurate.

As members of the interdisciplinary healthcare team, clinical pharmacists have daily responsibilities ranging from bedside patient care and medical rounds to didactic teaching and research.^{5,6} However, it is difficult to articulate clinical pharmacist productivity due to the cognitive and qualitative nature of their work.⁷

Currently, no national standard for clinical pharmacist productivity exists. Specific metrics must be identified to accurately represent the contributions of a clinical pharmacist.⁷ Previously published models measure broad, nonspecific metrics (eg, patient admission) or operational responsibilities (eg, doses dispensed).^{8,9} Pharmacy-focused productivity publications have recommended internal benchmarking, suggesting this method may be better equipped to address the institution-specific value of clinical pharmacists than external benchmarking.^{10,11} However, these models are limited by their lack of research on the results of implementation.

The University of North Carolina Medical Center (UNCMC) is a 933-bed academic medical center in Chapel Hill, NC. The UNCMC department of pharmacy includes more than 240 pharmacists and over 270 nonpharmacist staff members and provides a variety of clinical and operational pharmacy services. The department is also highly invested in the

education of pharmacy students, pharmacy residents, and trainees of other professions. Clinical pharmacists are integrated with service-based interdisciplinary teams to provide both clinical services and operational functions (eg, order verification). The pharmacy practice model uses both clinical pharmacy specialists and clinical pharmacy generalists, allowing all pharmacists to function in an advanced practice setting and provide comprehensive pharmacy services. Direct patient care responsibilities for clinical specialists and generalist are indistinguishable from one another and, for the purposes of the project described here, were incorporated equally.

Historically, UNCMC used adjusted patient days (APD) to measure pharmacist productivity. The metric at UNCMC for APD is a decision support–endorsed organizational metric that considers gross revenue, inpatient revenue, and volume of inpatient days. APD was developed for assessment of registered nurse patient load and is intended for flexible staffing models.¹² As APD is not a pharmacy-specific measure, it lacks the sensitivity to respond to nuances in pharmacy workload, including patient complexity and level of care. Further, APD information is not available in real time, limiting its day-to-day utility.

More recently, UNCMC began using medication charges as the primary measure for department of pharmacy productivity. The count of medication charges serves as a surrogate marker for workload. Acute care clinical pharmacists are divided between multiple subdepartments, and there is no single measure currently that represents the collective productivity of the acute care clinical pharmacists of the whole department.

As is evidenced by their definitions, APD and medication charges are productivity metrics that do not incorporate the many responsibilities of clinical pharmacists. Both APD and medication charges are poor metrics for understanding the granularity of pharmacy practice in the acute care clinical setting. The optimal metric for measuring clinical

pharmacist productivity would encompass operational and clinical responsibilities into a comprehensive measure reflective of pharmacist responsibilities. Such a metric could be useful for determining staffing needs within an organization and ensure appropriate distribution of workload among pharmacists.² This article describes a novel framework for measuring clinical pharmacist productivity that uses a weighting scheme developed by frontline clinicians.

Methods

Challenges with the current productivity measures coupled with the lack of an established professional standard were the impetus to develop a more detailed, pharmacy-specific productivity model. In 2016, UNCMC began a multipart project to capture clinical pharmacy productivity, with the goal of developing and validating an acute care clinical pharmacist productivity model. The first in a 2-part series, this article focuses on the foundation of productivity model development, whereby clinical pharmacist responsibilities were identified, defined, prioritized, and weighted. For the purposes of part 1, this research quantified workload but did not seek to ascribe value to responsibilities.

The purpose of the overall study (parts 1 and 2) was to develop, validate, and implement a clinical pharmacist productivity model. Study objectives included the following: determine comprehensive responsibilities of clinical pharmacists, validate responsibilities through direct observation, weight responsibilities to determine measures, and validate the overall model. The multiple steps and associated methodology used within this research are represented in Figure 1.

Delphi methodology was used to identify the responsibilities of acute care clinical pharmacists. The Delphi methodology allows for expert panelists to achieve agreement

through multiple repeated iterations from a group moderator.¹³ Ultimately, the goal when Delphi methodology is utilized is to provide a consensus on expert opinion in a given field.¹³ An expert panel of acute care clinical pharmacists from UNCMC was assembled to complete a 3-round Delphi consensus process.

All pharmacists participating on the panel were acute care clinical pharmacists. Ambulatory care clinical pharmacists and operations specialists were excluded. As part of their invitation to participate, the acute care clinical pharmacists were instructed that their recommendations throughout the consensus process were to represent their acute care clinical pharmacy specialty practice (eg, critical care, infectious diseases) rather than their individual opinions. The number of acute care pharmacists invited to participate was proportional to the overall number of acute care clinical pharmacists in each respective specialty area.

Prior to the Delphi consensus session, each panel member completed a questionnaire noting their responsibilities as an acute care clinical pharmacist. All questions (appendix) were open-ended to ensure the maximum number of responsibilities were collected. The questions were grouped into the following categories: direct patient care, education, student precepting and training, resident precepting and training, research, quality improvement, service, professional development, and other (activities that did not fit into one of the previously listed categories). These categories were included to help prompt acute care clinical pharmacists to respond with the full scope of their responsibilities. The questionnaire was sent via institutional email, using Qualtrics survey software (Qualtrics, Provo, UT), in October and November 2017 and was open for submission for 2 weeks. Participants were reminded at 1 week, 3 days, and 1 day before the questionnaire closed.

The consensus session consisted of 3 in-person rounds completed on a single day. Panelists were not incentivized or required to participate. Ranking and selection of acute care clinical pharmacist activities occurred electronically via Qualtrics, and the participants were blinded to the individual submissions.

Panelists selected 30 work-related time-consuming responsibilities in round 1. This initial list of 30 responsibilities was advanced to the second round, where it was narrowed to a list of 20 responsibilities. The list of 20 was created by using the responsibilities with the greatest number of rankings from the first round. The final round was dedicated to ranking the top 20 responsibilities in order of time consumption (from most amount of time to least amount of time). For the first 2 rounds panelists selected responsibilities that were the most time intensive without regard to rank order. The responsibilities were advanced to subsequent rounds based on total count. After the ranked list of 20 responsibilities was revealed, the panelists provided feedback, either during the live session or anonymously. Anonymous feedback was collected electronically.

Descriptive statistics were used to analyze the responses. For the final round, the median of each rank response was calculated by using the count of the acute care clinical pharmacist responsibilities. The final list of responsibilities was ordered by median, as this indicated a consistent ranking of time intensity amongst the panelists.

Following the consensus panel, observational time studies were conducted to validate the list of responsibilities. High school students participating in a summer internship program at UNC Eshelman School of Pharmacy observed clinical pharmacists in all practice settings and recorded the time spent on each responsibility. The students observed all acute care clinical pharmacists within UNCCMC by following them for a single day. Pharmacists

were instructed to state what activity they were completing, and the acute care clinical manager trained the students before observations were conducted.

A subset of the Delphi panel was retained as an ongoing working team tasked with building the productivity model. This working team consisted of 10 acute care pharmacists (2 each from critical care, heart and vascular, internal medicine, oncology, and pediatrics). They completed a second consensus meeting, resulting in weighting of the pharmacist responsibilities and corresponding work outputs for the productivity model. Consensus development panel methodology was also used to guide this step.¹³ As the first step in the consensus meeting, the working team was instructed to brainstorm all possible work outputs for each responsibility, regardless of feasibility or availability. A data analyst from the hospital was consulted on the electronic availability of all work outputs prior to the final step of weighting. The working team came to consensus on which work outputs would be utilized for each responsibility, ensuring that work outputs were not duplicative between responsibilities. Finally, the individual responsibilities were weighted relative to time intensity and complexity. The resulting weighted work outputs underwent a sensitivity analysis to guide the final productivity model.

Results

Of the 43 acute care clinical pharmacists at UNCMC, 23 (53%) were invited to participate in the Delphi panel and 23 (100%) participated. The pharmacists included as panelists represented all areas of acute care practice, including critical care, cardiology, emergency medicine, infectious diseases, internal medicine, oncology, pediatrics, psychiatry, and solid organ transplant. Clinical generalists were also included in the panel

and represented by the discipline in which they specialize. Composition of the panel is detailed in Table 2.

The 23 panelists individually submitted the initial questionnaire responses that formed the list of responsibilities for the Delphi consensus session. The responsibilities were combined into categories on the basis of similar function or description, resulting in a list of 56 distinct acute care clinical pharmacist responsibilities that was used in the in-person consensus session. The 56 responsibilities were classified into the following categories: direct patient care ($n = 10$ responsibilities), education ($n = 7$), quality improvement ($n = 6$), professional development ($n = 6$), research ($n = 7$), resident precepting and training ($n = 5$), student precepting and training ($n = 7$), service ($n = 4$), and other ($n = 4$). Following the 3 rounds of selection and ranking, a final list of 20 acute care clinical pharmacist responsibilities was produced and ordered by time intensity (Table 3). The ranking produced 5 pairs of responsibilities of equal rank. The acute care clinical pharmacists who participated on the panel affirmed the appropriateness of these results.

The observational time study did not show any variation of practical significance between the Delphi panel consensus rankings and the responsibilities observed. All variation was deemed irrelevant due to an inability to capture certain responsibilities or the seasonality of the responsibilities observed. For example, an increase in resident training and corresponding decrease in precepting occur annually when new pharmacy residents are in orientation, and the occurrence of these changes aligned with the time of year in which the observations were completed. The full results of the observational time study are listed as Table 4.

The working team recommendations for the second consensus meeting took into account both Delphi panel and observational time study results. The working team assigned

weights to all work outputs and all responsibilities utilizing consensus methodology after considering the relative time intensity and complexity of each element. A total of 27 work outputs and 12 subwork outputs were recommended for inclusion in the productivity model by the working team. The full results of the working team's recommendations are listed as Table 5.

Discussion

Delphi methodology provided a structured process to identify the daily acute care pharmacist responsibilities at UNCMC. This was the first list obtained at the institution utilizing validated methodology and with participation by the employees engaged directly in the responsibilities. While use of the Delphi method has been previously documented in professional pharmacy literature, to our knowledge the method has not been used in research on acute care clinical pharmacist productivity.¹⁴⁻¹⁶

Acute care clinical pharmacists gave input on their daily responsibilities via the Delphi panel and consensus development meeting. Additionally, the list of acute care clinical pharmacist responsibilities provided a foundation for the subsequent steps of productivity model development. The Delphi panel and consensus development meeting are hallmark features of this model. Engagement and active contribution by acute care clinical pharmacists allows for the greatest chance of success with the final model. Furthermore, the observational time studies reinforced the Delphi panel's ranked list of responsibilities. The weighting scheme provides a novel way to begin long-awaited answers to the question of clinical pharmacist productivity.

The process was unique, as the responsibilities were developed by a group of acute care clinical pharmacists who were highly engaged throughout the process. The organizers

of the project provided minimal direction to the acute care clinical pharmacists in terms of compiling the top 20 list of acute care clinical pharmacist responsibilities; this was purposeful and helped to ensure a high degree of pharmacist ownership and to minimize perceived interference from departmental leadership on the final list of responsibilities included in the model. To the knowledge of the authors, including frontline staff in the development of an acute care clinical pharmacist productivity model is a novel concept.

The Delphi panel and consensus development processes have potential applicability to other challenging and controversial topics pertaining to pharmacy practice. These tools as well as the process described here can be useful for other institutions desiring to address similar questions or resolve long-standing issues.

Limitations. Limitations to this process that should be noted include the decision to narrow the list of participants in the Delphi panel. A representative group of acute care clinical pharmacists was engaged, which therefore may have unintentionally resulted in the exclusion of activities. Another limitation included the process by which individuals were identified for invitation as a panelist. Pharmacy supervisors of the acute care pharmacists provided a list of pharmacists for consideration and requested to nominate individuals for participation. Furthermore, the specific details of the process described may not be applicable to all health systems, given the inherent variations in practice models, training of participants, and responsibilities performed. Despite these limitations, the consensus process described above can serve as a framework for institutions to not only evaluate acute care clinical pharmacist productivity but also to guide decisions requiring consensus from a group of experts.

Conclusion

The development of an acute care clinical pharmacist productivity model began with engagement of the individuals responsible for the work. Utilization of validated consensus methods resulted in the development of a weighted list of pharmacist responsibilities. The process that was used for the initial steps of the productivity model project are broadly applicable to other expert-based decision-making needs. These results provide a framework for reproducing these actions within other areas of the organization and external departments of pharmacy. The second article in the 2-part series will detail the process to build and validate the productivity model from the work outputs and responsibilities identified via the consensus steps.

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Disclosures

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Figure 1. Overall research methodology.

Figure 2. Initial working team consensus weighting. ED indicates emergency department; HIV, human immunodeficiency virus; ICU, intensive care unit; IV, intravenous; RPh, pharmacist; STEMI, ST-segment elevation myocardial infarction. iVent (Epic Systems Corporation, Verona, WI) refers to a documentation tool within the electronic health record.

Key Points

- Many current productivity models have limited applicability to acute care clinical pharmacists, and the literature published to date excludes acute care clinical pharmacist responsibilities.
- Engaging clinical pharmacists in the development of a novel clinical pharmacist productivity model can improve both buy-in and applicability.
- The Delphi method is a useful tool to reach consensus in pharmacy practice for topics that can be controversial or ambiguous.

Table 1. Characteristics of Delphi Panel Members (*n* = 23)

Characteristic	No. (%)
Male	7 (30)
Female	16 (70)
Practice area	
Clinical generalist	4 (17)
Pediatrics	4 (17)
Oncology	4 (17)
Critical care	3 (13)
Internal medicine	2 (10)
Cardiology	2 (10)
Infectious diseases	1 (4)
Psychiatry	1 (4)
Emergency medicine	1 (4)
Solid organ transplant	1 (4)
Degree and credentials	
Doctor of pharmacy	21 (91)
PGY1 residency completion	21 (91)
PGY2 residency completion	13 (57)
Board of Pharmacy Specialties certification	15 (65)
Years of practice experience	
Less than 5 years	4 (18)
5 to 10 years	12 (52)
Greater than 10 years	7 (30)

Table 2. Top 20 Acute Care Clinical Pharmacist Responsibilities

Rank	Responsibility	Median Ranking^a
1	Rounding (team rounds, transitions of care rounds, etc)	2
2	Profile review (prerounding, restarting home medications, hepatic dosing, renal dosing, medication therapy evaluation, etc)	2.5
3	Documentation (pharmacokinetics, notes, sign-out, consults, electronic health record messages, etc)	3.5
4	Order verification (entering orders, verifying orders, order clarification, medication substitutions, formulary interchanges, patient's own medication, etc)	4
4	Transitions of care (admission medication reconciliation, discharge medication reconciliation, education, counseling, transitions planning, etc)	4
6	Direct patient care precepting (reviewing patients, staffing experiences, etc)	6
7	Special population needs (medication assistance, prior authorization, chemotherapy, total parenteral nutrition, high-cost drug utilization, etc)	6.5
8	Calls (nursing and medical staff questions, changing products, troubleshooting, etc)	9.5
9	Non-direct patient care precepting (journal clubs, topic discussions, case presentations, in-services, didactic teaching, etc)	10
9	Staffing (cross-coverage, extra shifts or additional hours, weekend staffing, covering satellite pharmacy, on-call duty, etc)	10
11	Administrative activities (email, etc)	10.5
12	Meetings (staff meetings, department meetings, etc)	12
13	Committees and work groups (hospital-based, pharmacy and nonpharmacy, leading committees, etc)	12.5
13	Drug information (researching questions, drafting responses, reviewing policies and guidelines, etc)	12.5
15	Guidelines (drafting, updating, reviewing, maintaining, etc)	15
16	Critical response (code blue, rapid response, trauma, etc)	16.5
16	Mentoring (staff, residents, students, mentoring development, etc)	16.5
16	Research projects (precepting and mentoring, medication use evaluation, participation in research projects, developing posters/manuscripts, etc)	16.5
19	Education medical team (in-services, grand rounds, etc)	17.5
19	Resident training (orientation, staffing, etc)	17.5

^aBased on median rank responses in terms of time intensity. Lower median value denotes higher rank and greater time intensity.

Table 3. Comparison of Results of Consensus Ranking and Observational Time Studies

Consensus Rank	Responsibility	Observational Time Study Rank	Delta
1	Rounding	1	
2	Profile review	2	
3	Documentation	3	
4	Transitions of care	5	-1
5	Order verification	4	+1
6	Direct patient care precepting	15	-9
7	Special population needs	12	-5
8	Calls	11	-3
9	Non-direct patient care precepting	14	-5
9	Staffing	7	+2
11	Administrative time	9	+2
12	Meetings	6	+6
13	Drug information	8	+5
13	Committees and work groups	16	-3
15	Guidelines	17	+2
16	Critical response	19	-3
16	Research meetings	18	-2
16	Mentoring	13	+3
19	Medical team education	20	-1
19	Resident training	10	+9

Figure 1

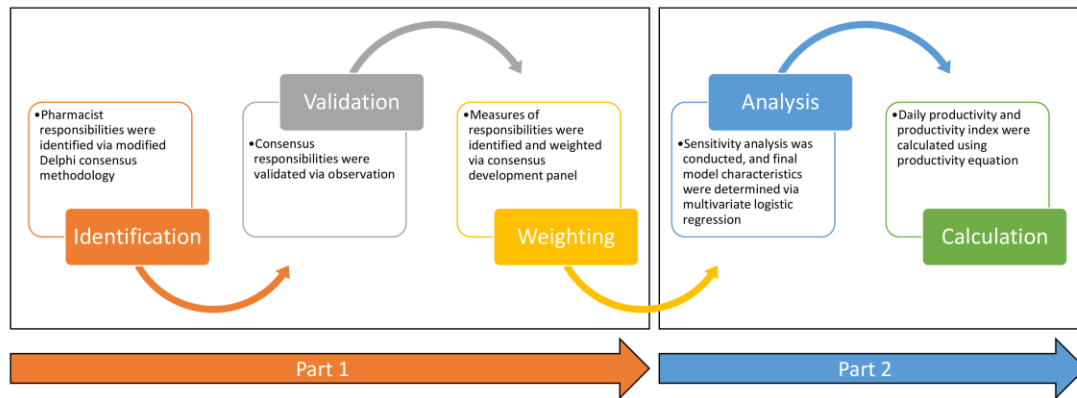


Figure 2

Responsibility (Weight)	Measure			Weight	
Rounding/profile review (45%)	No. of patients based on level of care	Submeasure	Weighting	25	
		ICU	40		
		Step-down	20		
		Floor	15		
		ED	20		
		Observation	2.5		
		Newborn	2.5		
	No. of patients with a renally adjusted medication				20
	No. of time-intensive medications (excluding high-dose IV methotrexate and bulsulfan) + total parenteral nutrition, IV immune globulin, iron dextran, itraconazole				20
	No. of patients with active chemotherapy orders				20
	No. of patients with HIV medications				5
	No. of patients on more than 8 vs more than 10 scheduled medications				10
No. of new inpatient admissions				10	
Order verification (20%)	No. of orders verified	Submeasure	Weighting	55	
		No. of new orders	70		
		No. of transfer orders	10		
		No. of edit orders	10		
		No. of discontinued orders	10		

	No. of RPh initiated orders	Submeasure	Weighting	30
		No. of orders entered by RPh	75	
		No. of orders discontinued by RPh	25	
	No. of patient-supplied medications			10
	No. of pharmacist-initiated dispenses			2.5
	No. of “adjust time” medication messages			2.5
	Transitions of care (10%)	No. of admission medication reconciliations completed		15
No. of discharge medication reconciliations completed		60		
No. of patients counseled		25		
Documentation (15%)	No. of notes written by a pharmacist		90	
	No. of times educational material is provided to patient		5	
	No. of iVent notes entered by RPh		5	
Critical response (2%)	No. of code blue responses		60	
	No. of code trauma responses		20	
	No. of code stroke responses		10	
	No. of code STEMI responses		5	
	No. of code sedation responses		5	
Education (8%)	No. of cosigned notes <u>or</u> No. of pharmacy student notes <u>or</u> No. of pharmacy-student reviewed medication histories <u>or</u> No. of learners		100	