Implementing the Use of Pharmacist Progress Notes in a Surgical ICU

Tyler Sledge, PharmD; Nick Lonardo, PharmD*; Heidi Simons, PharmD, BCPS*; and Wayne Shipley, PharmD, BCPS**

ABSTRACT

Background: Critical care pharmacists are established and valuable members of the critical care team, however there is rarely written evidence of their daily involvement in the patient's electronic medical record (EMR). Documentation in the EMR has the advantage of ensuring a seamless pass-off and provides an opportunity to capture the pharmacist's cognitive and clinical impact in a way that traditional systems of tracking "interventions" fail to do. We investigated implementation of pharmacist progress notes in a surgical intensive care unit (ICU) and their utility in measuring pharmacist activity.

Methods: Daily pharmacist progress notes written in a surgical ICU over a period of 2 months were reviewed. Each pharmacist action identified through progress note review was quantified and scored by an independent reviewer using a newly developed scoring system, the clinical impact score (CIS). This was developed as a way to quantify pharmacist actions and to classify those actions by clinical impact.

Results: Four hundred sixty-two daily pharmacist progress notes were reviewed over a 2-month period. There were 1,055 actions identified that resulted in a therapy change. Four of these actions resulted in the potential avoidance of a sentinel event. Of patients with at least 5 progress notes ($n = 44$), the majority of pharmacist actions occurred on ICU day 1.

Conclusion: The results of this descriptive study demonstrate that the implementation of daily pharmacist progress notes is feasible in an advanced practice setting, and the pharmacist's contribution to patient care may be obtained through review of this documentation in the patient's medical record. The critical care pharmacist's daily involvement in patient care most commonly results in optimization of pharmacotherapy and avoidance of drug misadventure.

Key Words—adverse drug event, clinical impact, collaboration, documentation, pharmacist

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The Society of Critical Care Medicine (SCCM) and the American Society of Health-System Pharmacists (ASHP) encourage the care of complex critically ill patients through the use of an interdisciplinary care model.^{1,2} For more than a decade, pharmacists specializing in critical care have been valuable and established members of the interdisciplinary critical care team, as their involvement has been associated with an improvement in patient safety, reduced drug costs, decreased intensive care unit (ICU) length of stay, quality of life, and overall

mortality.^{3–7} Due to the substantial literature linking pharmacists in the ICU to improved patient outcomes, the question has shifted from whether there should be a pharmacist presence in the ICU to whether there is enough pharmacist presence in the ICU, as written in an editorial by Chant and colleagues.⁸ Technological advances such as electronic medical charting and computerized prescriber order entry (CPOE) have decreased the distributive role of pharmacists and provided an opportunity for them to spend more time on high-level, cognitive-based

*University of Utah Hospitals and Clinics, Salt Lake City, Utah. Corresponding author: Tyler Sledge, PharmD, University of Utah Hospitals and Clinics, 50 N. Medical Drive, A-050, Salt Lake City, UT 84132; phone: 801-587-2485; fax: 801-585-0403; e-mail: tyler.sledge@hsc.utah.edu

functions. These advanced roles have been described as “desirable” or “optimal” functions of critical care pharmacists in a 2000 American College of Clinical Pharmacy and SCCM position paper and include, but are not limited to, consistent daily participation in direct patient care, aiding physicians to make informed decisions regarding available treatment options, developing institutional protocols, participating in all parts of the research process, and providing education.^{6,9}

Despite this expansion in clinical practice, there is rarely written evidence of the pharmacist’s contribution to direct patient care in the patient’s medical record.¹⁰ Documentation in the electronic medical record (EMR) is encouraged as a best practice by ASHP,^{10,11} and it has been suggested as a standard of practice for pharmacists to assert responsibility for their role in medication therapy management.⁹ Documentation by pharmacists not only provides valuable medication insight to other pharmacists and team members, which ultimately could reduce the chance of medication error,¹² but also serves as an accurate and proactive description of pharmacist activity. This record of activity could provide valuable insight into the clinical and financial significance of pharmacist involvement, which is vital as rising health care costs necessitate all members of the interdisciplinary team quantify their value to administrative personnel.

At our institution, historical attempts to justify clinical pharmacy services have been based on systems that retrospectively track “interventions” such as intravenous to oral (IV to PO) conversions, the discontinuation of unnecessary medications, and drug dosing recommendations based on renal function. Although these activities are significant, keeping tally marks for each of these “interventions” in the critical care setting fails to fully describe the cognitive and collaborative function of the clinical pharmacist in an advanced practice environment. This method also fails to communicate important pharmacotherapy follow-up information to other members of the interdisciplinary team as well as the team that follows the patient on transfer to the floor. In many respects, there was no written evidence in the EMR of the pharmacists’ contribution to the patient’s care or the communication of pharmacotherapy recommendations to the interdisciplinary team. Therefore, pharmacists in our surgical intensive care unit (SICU) started writing daily progress notes that included their contribution to the patient’s care. We then developed a clinical impact score (CIS) in an effort

to describe the nature of pharmacist activity and to quantify its clinical impact in this critical care setting. Hence, the purpose of this descriptive study is to describe the implementation of pharmacist progress notes in a critical care setting and to quantify the number of pharmacist actions as well as their clinical impact via a retrospective review of pharmacist progress notes in the EMR.

MATERIALS AND METHODS

This study is a retrospective review of daily pharmacist progress notes written on patients in the SICU of a single academic medical center. At the time of this review, the institution utilized Cerner *PowerChart* EMR. All medication orders are entered through CPOE, and IV infusions are given through *Alaris* pumps with safety guardrails in place. The SICU at the University of Utah Hospital consists of 20 beds with approximately 1,300 admissions annually. A wide variety of critically ill patients are admitted from multiple services, including cardiothoracic surgery (28.9%), general surgery (19.3%), trauma (23.5%), transplant, urology, vascular, ENT, and orthopedics. Patients are managed by a multidisciplinary team of attending intensivists, resident physicians, nurses, respiratory therapists, dietitians, and specialty trained clinical pharmacists. This is an open unit with multiple services admitting patients, but the multidisciplinary ICU team rounds on every patient on a daily basis. Several nursing-driven protocols are utilized, including hyperglycemia, sedation, electrolyte, and unfractionated heparin. The SICU pharmacists are involved in the care of every admission to the SICU and are available on the unit from 7:00 a.m. to 3:30 p.m., 7 days per week. The pharmacist, or a pharmacy resident under pharmacist supervision, rounds daily with the interdisciplinary ICU team. There is no pharmacist on call for 24 hours specifically for the SICU, although other clinical pharmacists are available in the hospital after 3:30 p.m. as needed. Additionally, pharmacists in the unit respond to codes, participate in protocol development, precept residents and pharmacy students, and participate in research efforts. All of the primary or supervising pharmacists rounding and writing daily progress notes have completed critical care specialty residency training.

The SICU clinical pharmacy team began writing daily pharmacy progress notes in April 2011. Prior to the initiation of progress notes, daily handwritten monitoring forms were used to share important

clinical information with each other while utilizing verbal pass-off to physicians and other pharmacists not working in the SICU. On a typical weekday, notes were consistently written on each patient in the unit. On weekends, notes were written only on the most complex patients with significant pharmacy issues (as determined by the pharmacist staffing the unit). This was due to the larger number of patients that each pharmacist had to care for on the weekend. The SICU pharmacists report, anecdotally, that note writing takes anywhere from 10 minutes (less complex patients, not new to the unit) to 45 minutes (new admission, complex pharmacy issues) per patient. Pharmacy progress notes were written electronically using the Cerner PowerNote system in *PowerChart* EMR and were a part of the patient's permanent medical record. Notes were free-text with some degree of variation between pharmacists; however, several standardized sections were present in each note including history of present illness, past medical history, recent surgeries, 24-hour events, and pharmacist assessment/actions. No formal training was provided to pharmacists on writing progress notes, but the format and all of the note sections as specified above were agreed upon by the pharmacists involved. An example of the standard progress note format can be found in **Figure 1**. Pharmacist actions were typically listed in bulleted form. If the action was a recommendation by the pharmacist that resulted in a therapy or monitoring change, the pharmacist would include the notation "done" at the end of the bulleted statement. If the action did not result in therapy change and was left simply as an assessment of medication therapy or as follow-up information for other practitioners, the pharmacist would include the notation "follow-up" at the end of the bulleted statement. This standardized notation was determined prior to the start of writing notes and was intended to more clearly delineate whether or not the pharmacist's recommendation actually resulted in therapy change or further follow-up was needed by the pharmacist who was actively following the patient.

To ensure consistency in the interpretation, only one pharmacist trained in critical care at the institution (T.S.) retrospectively reviewed the pharmacist progress notes written in the SICU from May 1, 2012 to July 1, 2012. The reviewer did not regularly staff the SICU and did not discuss the contents or interpretation of the notes with the SICU pharmacists. We delayed reviewing the progress notes for over 1 year to allow the pharmacists sufficient time to acclimate to the

1. Brief HPI

2. 24-hour Events

3. Actions:

- * Plts down to 48, consider holding aspirin (done)
- * Discussed ordering HIT panel, results pending (follow-up)
- * Consider increasing vancomycin dose to 1250 mg IV q12 hours based on steady state trough of 9 (done)
- * Nutrition/PO Medication/Bowel Regimen, patient is currently NPO for OR - will reassess on daily basis (follow-up)
- * Consider starting bowel regimen to prevent constipation from opiate use (done)
- * Will clean MAR of medication no longer being used per RN (X4)

Figure 1. Example of pharmacy progress note. HIT = heparin-induced thrombocytopenia; HPI = history of present illness; IV = intravenous; MAR = medication administration record; NPO = nothing by mouth; Plts = platelets; PO = oral; RN = registered nurse.

change in workflow associated with documentation. The notes were randomly sorted by text using an Excel spreadsheet; a sample of the first 462 notes were reviewed and included in the final analysis. The final number of notes reviewed was dictated by the time constraints of the first author's critical care postgraduate year 2 (PGY2) pharmacy residency. Based on the historical census of the SICU and the number of daily progress notes being written, we chose to review a sample of the daily progress notes for a 2-month time period. It was thought that this would provide an adequate number of notes to sufficiently quantify the impact of pharmacy services. On review of the notes, each action was scored using the CIS system developed by the SICU clinical pharmacists and critical care pharmacy resident. The CIS measures the therapeutic impact of each action (see **Table 1**).

This is an ordinal scoring system in which the highest number represents the highest level of clinical impact. A CIS was recorded for every pharmacist action documented in the EMR. Other data collected included admitting service, date of note, hospital day, author of note, and the medication class involved. The primary outcome of this review was the number of pharmacist actions stratified by level of impact (CIS). The secondary outcomes evaluated included the number of prevented sentinel events and the amount of pharmacist activity in patients newly admitted to the ICU. For example, the number of actions on ICU day 1 compared patients who had been in the unit for multiple days (ICU day 2, 3, 4, etc). This project was approved by the institutional review board at the University of Utah Hospital.

Table 1. Clinical impact score (CIS)

Score	Description
5	Prevention of a sentinel event (unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof) <u>Examples:</u> <ul style="list-style-type: none"> • Stop a drug in which a patient has a contraindication based on clear history of previous harm • Gross dosing error
4	Pharmacist collaboration with the team may have prevented exposure to medication well known to cause an adverse event that would likely harm a patient and prolong the patient's stay in the ICU and hospital based on clinical course and history <u>Examples:</u> <ul style="list-style-type: none"> • Anticoagulation, sedation, antiarrhythmic medication, insulin
3	Optimize the patient's pharmacotherapy with greater likelihood of efficacy, which may or may not have reduced the risk of an adverse event <u>Examples:</u> <ul style="list-style-type: none"> • Start new medication • Optimize dosing
2	Minimize drug exposure, thereby reducing likelihood of adverse event <u>Examples:</u> <ul style="list-style-type: none"> • Discontinue medication • Decrease dose based on change in patient's condition • Recommendation and follow-up for drug level monitoring
1	No likely difference in patient outcome but may help the team simplify the patient's drug regimen <u>Examples:</u> <ul style="list-style-type: none"> • Clean medication administration record • Follow-up recommendation

RESULTS

A description of the number of notes evaluated and actions extracted from them can be found in **Figure 2**. During the 2-month time period, 607 progress notes were written on a total of 142 patients (approximately 4.3 notes per patient). A total of 1,922 actions were documented in the notes. To more closely assess the actions that directly resulted in a therapy or monitoring change, only activities noted as “done” were included in the analysis. After this exclusion was applied, there were a total of 1,055 actions that resulted in a change to a patient's medication regimen. All of these pharmacist's actions were documented in the patient's medical record over a 2-month period.

Figure 3 shows actions that resulted in therapy or monitoring change as stratified by the CIS ($n = 1,055$). The majority of actions were given a CIS of 3 (51%), which represents improving therapeutic efficacy. This was followed by 28% of actions given a CIS of 1 (simplifying the patient's medication regimen), 19% with a CIS of 2 (minimizing medication exposure), less than 1% ($n = 22$) with a CIS of 4 (preventing exposure to harmful medication), and 4 actions with

a CIS of 5 (prevention of a sentinel event). **Table 2** shows the most common intervention types associated with each impact score including a description of each sentinel event prevented.

Figure 2. Number of progress notes evaluated and the number of pharmacist actions. eMAR = electronic medication administration record.

Figure 3. Actions resulting in therapy change stratified by clinical impact score (CIS).

The most common medication classes associated with pharmacist interventions include anticoagulation, antibiotics, gastrointestinal agents, sedation, analgesics, insulin, and antiarrhythmic medications. Recommendations on these classes of medications included (but not limited to) initiation of medication,

optimizing doses based on patient-specific monitoring, antimicrobial stewardship, and dosing based on pharmacokinetic calculations. Pharmacists were also significantly involved in writing total parenteral nutrition (TPN) orders, initiating and adjusting protocols, and ensuring appropriate stress ulcer and deep venous thromboembolism (DVT) prophylaxis.

In a subset of patients with at least 5 daily progress notes ($n = 44$), we evaluated the amount of pharmacist activity per ICU day. In these 44 patients, a total of 903 actions were documented. **Figure 4** shows the number of actions per ICU day. The highest percentage of actions occurred on ICU day 1 (32%), followed by 23% on day 2, 17% on day 3, 17% on day 4, and 11% on day 5.

We also extrapolated these results (collected over a period of 2 months) to 1 year to estimate the annual number pharmacist actions that would be documented in the patient's medical record. This estimation assumes a constant rate of SICU admissions and a consistent rate of pharmacist actions resulting in a change in pharmacotherapy. Over the course of 1 year, this approximates to 3,642 pharmacist daily progress notes and 11,532 total actions, with 6,306 of these actions directly resulting in therapy change and the prevention of 24 potential sentinel events.

Table 2. Examples of the most common actions associated with each impact score

Score	Description
1 (simplifies drug regimen)	<ul style="list-style-type: none"> • Clean medication administration record (duplicates, order clarification, etc) • IV to PO
2 (decreases drug exposure)	<ul style="list-style-type: none"> • Antibiotic stop date • Renal dosing adjustment • Routine drug level monitoring • Discontinue medication no longer indicated
3 (optimizes pharmacotherapy)	<ul style="list-style-type: none"> • Add basal insulin • Add bowel regimen • Add DVT prophylaxis • Add home medications
4 (prevents/minimize exposure to drug well known to increase harm)	<ul style="list-style-type: none"> • Minimize antipsychotic use with prolonged QTc interval • Minimize sedation in delirious patient • Stop nephrotoxic antibiotics based on culture results in a patient with renal failure
5 (sentinel event prevention)	<ul style="list-style-type: none"> • Discontinue heparin based on observed platelet drop secondary to HIT (x2) • Patient NPO with ileus chronically malnourished, hypoglycemic several times necessitating bolus doses of D50. Discontinued insulin infusion and other insulin sources; added continuous dextrose source as MIVF with D5NS @ 50 mL/h while NPO (done) • Discontinue enoxaparin with the placement of epidural; advised team on when drug cleared from system

Note: D50 = dextrose 50%; D5NS = 5% dextrose in normal saline; DVT = deep venous thrombosis; HIT = heparin-induced thrombocytopenia; IV = intravenous; MIVF = maintenance intravenous fluid; NPO = nothing by mouth; PO = by mouth; QTc = corrected QT interval.

Figure 4. Number of actions per intensive care unit (ICU) day.

DISCUSSION

Through pharmacist documentation in the EMR, we were able to capture a significant number of pharmacist actions, the majority of which resulted directly in therapy change. Although there have been many studies quantifying the number of pharmacist “interventions,” in different settings, this is the first study to extract pharmacist activity from daily ICU progress notes written in the patient’s permanent EMR.

This study provides a proactive description of pharmacist activities and their impact on patient care in an advanced critical care practice. Documentation in the patient’s chart is necessary as pharmacists in the critical care environment cannot currently bill for their services, and administrative personnel need concrete data to support their decision to maintain and even expand the pharmacist’s role in critical care areas. In the critical care environment, a team approach is required in order to provide optimal patient care through medical decision making and medication management. Documentation in this capacity serves as an effective method of communication between team members as well as a mechanism to demonstrate the pharmacists’ contribution to patient care. Additionally, it has been suggested that documentation must become the standard of practice in order for pharmacists to be recognized as accountable, independent clinical practitioners.⁷ According to a 2013 hospital survey conducted by ASHP, 59% of hospitals require pharmacists to document their interventions, some of which are in the patient’s permanent medical record.¹³ The nature of this documentation is unclear. Several published studies have evaluated the clinical impact of pharmacists through

retrospective review of interventions that were input by pharmacists into different intervention tracking systems not part of the patient’s EMR.^{14,15} One study by Hamblin and colleagues demonstrated a significant cost savings through retrospective review of pharmacist interventions in a patient population similar to that of the SICU.¹⁶ As with the previously addressed publications,¹⁴⁻¹⁶ these interventions were input by pharmacists into a third-party intervention tracking system not part of the patient’s permanent medical record. Hamblin et al report 2,574 interventions input by pharmacists over 1 year resulting in an estimated cost savings of more than \$500,000. Conversely, the number of pharmacist interventions documented in the patient’s medical record in our study extrapolated to 1 year (assuming consistent documentation) is 6,306, but we did not perform our own cost analysis. We suspect the discrepancy in number of interventions between our evaluation and that of Hamblin et al is due to reporting bias (lower percentage of interventions were documented in their system). These third-party systems for reporting interventions may serve as a quick and reportable method for documenting pharmacist activity, however they are not part of the medical record, they fail to elucidate the pharmacist’s assessment, and they do not serve as a communication tool to other team members. Our study is unique in that our pharmacists wrote detailed progress notes in the EMR that primarily served as a mechanism for communicating among the interdisciplinary team members and only secondarily served as a mechanism to document the pharmacists’ recommendations. Although we did not assess how useful these progress notes were to other members of the multidisciplinary team, this would be a valuable area for investigation.

Prior to the initiation of daily progress notes, our critical care pharmacists used daily handwritten monitoring forms for sharing important clinical information with each other and used verbal pass-off to physicians and other pharmacists. This method is limited, especially when patients are transferred out of the critical care unit. There is no consistent communication of important medication follow-up issues to the receiving service(s). Furthermore, there is no documented evidence that the pharmacists collaborated with the interdisciplinary team.

Pharmacist documentation in the form of daily progress notes was based on a free-text format. This method of documentation requires a significant time commitment not common to other forms of

documentation where pre-populated interventions are available with “check” boxes for the pharmacists to click. We chose to pursue the free-text format to allow the pharmacists to write out their individualized pharmacotherapy assessments. These written assessments in the form of a daily progress note function as a historical record of the rationale behind pharmacotherapy decisions and give a clear individualized plan for monitoring and follow-up. Anecdotally, the SICU pharmacists have reported that note writing takes from 10 minutes (less complex patients, not new to the unit) to 45 minutes (new admission, complex pharmacy issues) per patient. We understand that daily progress notes may not be feasible in all areas of the hospital or in units in which there is a large patient to pharmacist ratio; however, we feel that this study is an important start to developing widespread methods of pharmacist documentation.

The CIS was developed specifically for the SICU population as a way to quantify the clinical impact of pharmacists in the critical care setting. Prevention of adverse drug events was given the highest priority due to their detrimental impact on patient outcomes and high medical and legal costs associated with their occurrence.¹⁷⁻¹⁹ Prevention of a sentinel event was chosen as the highest level of pharmacist impact and was defined as such according to The Joint Commission.²⁰ The argument could be made that the prevented sentinel events as determined by the data reviewer would not have occurred even without pharmacist intervention. There is no way to establish that the pharmacist’s intervention would have unequivocally prevented the sentinel events from occurring, but we provided a detailed description of the pharmacist action to allow for individual interpretation of its potential clinical and financial impact (Table 2). The medication classes most commonly affected by pharmacist actions (anticoagulation, antibiotics, gastrointestinal agents, sedation, analgesics, insulin and antiarrhythmic medications) are similar to those reported in previous literature.²¹

The strength of this study is in the fact that all pharmacist actions were documented and retrievable from the patient’s permanent medical record. Additionally, the CIS scale was developed to better quantify pharmacist’s actions by clinical impact in the critical care environment. All actions were retrospectively scored using the CIS by one critical care trained pharmacist, which eliminated the chance of variability between multiple raters. Importantly, the pharmacists did not score their own interventions.

This scale was newly developed, and we attempted to reduce the amount of subjectivity associated with its use by keeping detailed descriptions of each action and how it was scored.

There are several limitations to this analysis that should be considered. Writing free-text progress notes that include all actions and follow-up information can be a time intensive process depending on the pharmacist to patient ratio in a particular unit. Therefore, the feasibility of writing daily progress notes will depend on the institution and the specific staffing for a particular unit. It will also depend on the level of training and experience of the individual practitioners. Although note writing has been a consistent practice in the SICU, other areas of the hospital are developing ways to efficiently document meaningful information; this process can reportedly be improved through structured education and standardizing documentation practices.²² All pharmacists involved made an effort to document all of their actions, but it is possible that not all pharmacist involvement was documented in a progress note. In addition, there were 607 pharmacists’ progress notes written during the 2-month study time period, but only 462 of the progress notes were reviewed. It is possible that our sample did not fully represent the complete practice. A more comprehensive study could be extended over a longer period to better represent the true pharmacist’s activity rate. From a legal standpoint, documentation in the patient’s medical record may increase pharmacist’s liability, but taking responsibility for the recommendations we provide is a core principle of providing pharmaceutical care²³ and gives pharmacists greater professional credibility. Based on our experience, we feel that pharmacists should have training as to what should be included in progress notes and how the recommendations are communicated. For example, we consistently use words like “consider” or “suggest” to give the provider a choice to either accept or reject the recommendation. Having said this, we believe that the potential increased legal risk is warranted as other disciplines regularly document in the patient’s record. We are hopeful that pharmacist documentation could help protect the team from legal scrutiny resulting from incomplete or unclear documentation.

There are also limitations with the use of the CIS that need further evaluation. First, these scoring systems have not been validated in other critical care areas of our institution or any other institution. Even though these scoring systems were purposefully

developed to be expansive enough to accurately encompass the clinical practice by other critical care pharmacists, they will need to be validated in other ICUs outside of the SICU population. Also, only one critical care-trained pharmacist was responsible for reviewing the progress notes. Multiple reviewers would be required to test intra-observer agreement to more accurately determine the strength of these scoring systems.

CONCLUSION

The results of this descriptive study demonstrate that daily progress notes are feasible in an advanced practice setting. Additionally, the contribution to patient care by critical care pharmacists may be obtained through review of documentation in the patient's medical record. The critical care pharmacist's daily involvement in patient care most commonly results in optimization of pharmacotherapy and avoidance of significant drug misadventure.

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