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American College of Clinical Pharmacy (ACCP) Critical Care Practice and Research Network (PRN)

Opinion Paper

Proposed Title: Clinical Pharmacist Services within Intensive Care Unit Recovery Clinics: An Opinion of the Critical Care Practice and Research Network of the American College of Clinical Pharmacy

Running Title: ICU Recovery Clinic Clinical Pharmacists

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This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as doi: [10.1002/jac5.1311](https://doi.org/10.1002/jac5.1311)

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Conflict of Interest: The authors declare no conflicts of interest.

This paper represents the opinion of the Critical Care Practice and Research Network of the American College of Clinical Pharmacy (ACCP). It does not necessarily represent an official ACCP commentary, guideline, or statement of policy or position.

Abstract:

Intensive care unit recovery clinics (ICU-RCs) have been proposed as a potential mechanism to address the multifaceted unmet needs of intensive care unit (ICU) survivors and caregivers. The needs of this population include, but are not limited to, medication optimization, addressing physical function and psychological needs, coordination of care, and other interventions that may help in improving patient recovery and reducing the rate of preventable readmissions. The objective of this opinion paper is to identify and describe clinical pharmacy services for the management of ICU survivors and their

caregivers in an ICU-RC. The goals are to guide the establishment and development of clinical pharmacist involvement in ICU-RCs and to highlight ICU recovery research and educational opportunities. Recommendations provided in this paper are based on the following: a review of published data on clinical pharmacist involvement in the ICU-RCs; a consensus of clinical pharmacists who provide direct patient care to ICU survivors and caregivers; and a review of published guidelines and literature focusing on the management of ICU survivors and caregivers. These recommendations define areas of clinical pharmacist involvement in ICU-RCs. Consequently, clinical pharmacists can promote education on Post Intensive Care Syndrome and Post Intensive Care Syndrome-Family; improve medication adherence; facilitate appropriate referrals to primary care providers and specialists; ensure comprehensive medication management and medication reconciliation; provide assessment of inappropriate and appropriate medications after hospitalization; address adverse drug events, medication errors, and drug interactions; promote preventive measures; and facilitate medication acquisition with the goal of improving patient outcomes and reducing health care system costs.

More than 5.7 million intensive care unit (ICU) admissions occur annually in the United States with a reported survival rate of 71% to 90% in adults.¹ Among adult ICU survivors, reported readmission rates were 15% at 30 days, 26% at 90 days, and 43% at 1 year.² Forty-five percent of these patients had increased resource utilization. In addition to readmissions, ICU survivors are at increased risk of mortality and decreased quality of life compared with the overall population.³ ICU survivors may experience several complications following their hospitalization. These complications can include new or worsening cognitive impairment (greater than 75%), mental health conditions (up to 62%), physical disabilities (ICU-acquired neuromuscular weakness reported in greater than 25%), financial issues (33% to 50%), and social impairment.^{4,5} Given the high, and often overlapping frequency of these post-ICU morbidities, the Society of Critical Care Medicine (SCCM) developed the term “Post Intensive Care Syndrome” (PICS) to identify the presence of one or more of these impairments for ICU survivors and their caregivers.^{4,5} PICS is defined as “new or worsening impairments in physical, cognitive, or mental health status arising after critical illness and persisting beyond acute care hospitalization.” Post-intensive care syndrome is also seen in caregivers, denoted by the term Post Intensive Care Syndrome-Family (PICS-F).^{4,5} PICS and PICS-F are considered a public health burden; however, the true impact of these syndromes to patients, their families, and the general public is unknown.

In addition to PICS, this population may be challenged with re-introduction to society, financial insecurities associated with daily living expenses and health care costs, loss of job or job obtainment, low health literacy, and management of current and new chronic conditions. Furthermore, those unable

to return home immediately following their ICU stay may undergo a complicated sequence of care transitions (e.g., skilled nursing facility) increasing the risk of problems at each transition.

Medication-Related Problems

During transitions of care of ICU patients, medications are frequently initiated, discontinued, or adjusted, especially in the setting of multifaceted pathophysiological and physiological changes (e.g., renal insufficiency, acute liver injury, hypotension) that often occur during a critical illness. ICU survivors are often discharged from the hospital with new medical diagnoses, increased medication regimen complexity, decreased physical or cognitive function, and increased self-management responsibilities related to medication use. These medication and health-related changes can also impose further burdens on caregivers.⁶ Additionally, patients may be initiated on medications during their critical illness that are often inappropriately continued, exposing them to harmful and unnecessary medication side effects.⁷

Currently, there are limited data evaluating medication-related problems (MRPs) identified during these transitions. One multicenter, retrospective study (58 ICUs; N=985) showed that almost half of patients experienced medication errors (MEs) during transition from ICU to non-ICU locations.⁸ Common MEs included medication continuation with ICU-only indication (28.4%), untreated condition (19.4%), and medication without indication (11.9%). There have been several studies evaluating medication-related interventions during these transitions. These interventions included deprescribing of ICU-initiated medications such bronchodilators, atypical antipsychotics, and stress ulcer prophylaxis,

as well as re-initiation of home medications.⁹⁻¹² Therefore, it is crucial to review patients' medication lists to ensure they are receiving appropriate medications during each transition of care.

ICU Recovery Clinics

ICU survivors are usually cared for by primary care physicians (PCPs) and/or specialists, depending on their comorbidities, when discharged from the hospital and followed in the outpatient setting.¹³ Unfortunately, the shortage of PCPs and sparse availability of specialized clinics designed specifically for post-ICU care may limit a provider's ability to dedicate sufficient time to provide extensive disease state and medication counseling in ICU survivors.¹⁴ Many health care professionals may not be able to appropriately manage and treat ICU survivors because of the complexity and unfamiliarity of care required in these patients. Additionally, ICU survivors are frequently those with complex medical conditions under the care of multiple specialties.¹³ This can lead to hesitancy in adjustment of therapies without input from those specialists. Therefore, appropriate coordination of care is required to care for these patients. These issues helped to provide one aspect of the foundation for SCCM to develop the THRIVE Collaborative, an initiative which aimed to improve care and provide support for ICU survivors and caregivers.¹⁵ The THRIVE Collaborative's mission is to provide education to ICU and non-ICU medical providers about PICS, to lead the establishment of support groups for survivors of critical illness and their families, and to lead the development of ICU-RCs. More recently, the Critical and Acute Illness Recovery Organization (CAIRO) was developed to help improve outcomes for ICU survivors and their families.¹⁶ These organizations called on health care systems to address how to care for these high-risk patients and caregivers, especially with the potential risk of deterioration and readmission.³

ICU-RCs have been proposed as a potential mechanism to address the multifaceted unmet needs of ICU survivors and caregivers. The needs of this population include, but are not limited to, medication optimization, addressing physical function and psychological needs, coordination of care, and other interventions that may help in improving patient recovery and reducing the rate of preventable readmissions. The ICU-RC team often consists of an interprofessional group aimed at identifying and treating many complications impacting ICU survivors, and in some cases, caregivers. Various specialties may make up the interprofessional team including critical care intensivists, advanced practice providers, nurses, respiratory therapists, physical and/or occupational therapists, psychologists, social workers, and clinical pharmacists. One study showed no significant difference in readmission rates in patients receiving care through the interprofessional ICU-RC versus usual care (14.4% vs 21.5%; $p=0.16$); however, early readmissions within 7 days was lower in the ICU-RC group.¹⁷

As ICU-RCs are developed to address the needs of ICU survivors with often new and complex medication regimens, clinical pharmacists should be key members of ICU-RC staff. Clinical pharmacists, especially critical care clinical pharmacists¹⁸⁻²⁰, practicing in this setting contribute an important skill set to appropriately assess potential MRPs, address PICS, assist with medication procurement issues, and educate patients on their medication-related issues. As pharmacotherapeutic experts, clinical pharmacists are uniquely poised to perform high quality medication reconciliation accompanied by real time medication therapy recommendations and regimen modifications to promote medication safety and adherence.^{4,21,22}

The purpose of this opinion paper is to describe the practice and scope of clinical services provided by clinical pharmacists in ICU-RCs. Specifically, the goals of this paper are to describe the roles and activities of clinical pharmacists within ICU-RCs, to outline studies that have shown gaps in care and where clinical pharmacists can impact care, to outline potential strategies to develop a position proposal for ICU-RC clinical pharmacists, and to provide guidance on recommended training and competencies of ICU-RC clinical pharmacists. Recommendations of this opinion paper were based on the following: a review of published data on clinical pharmacist involvement in the management of ICU survivors and caregivers; a consensus of clinical pharmacists who provide direct patient care to ICU survivors and caregivers and practice in different pharmacy models, including community-based and academic settings; and a review of published guidelines and literature focusing on the management of ICU survivors and caregivers.

Developing Roles and Responsibilities of the ICU-RC Clinical Pharmacist

Clinical Pharmacist Roles

It is important to understand the current role and activities of an ICU-RC clinical pharmacist prior to development and implementation of a clinical pharmacist service in an ICU-RC. One survey based study described the activities of clinical pharmacists in ICU-RCs (n=9).²³ This study reported that all the clinical pharmacists are critical care trained and most of them serve within the clinic setting in addition to their ICU practice. Many ICU-RC clinical pharmacists are embedded within the clinic and see each patient scheduled for physician appointments, while others may only see patients based on referral. All clinical pharmacists reported that direct patient care was provided during every patient visit. Research, patient

enrollment, clinic design, and administrative activities were other roles clinical pharmacists were involved in outside of direct patient care. During the patient visit, 78% of clinical pharmacists reported that they always conducted medication reconciliation. Other activities and description of the clinics and clinical pharmacist activities are listed in Table 1 and Table 2.

Within the area of ICU recovery, there is a definitive role for clinical pharmacist services to address survivors' medication-related needs. Several studies support the role of a clinical pharmacist within the ICU-RCs. These studies reported that clinical pharmacist interventions in the ICU-RCs included the identification and management of MRPs, which often involved: 1. Inappropriate discontinuation of chronic medications at hospital discharge, 2. Inappropriate continuation of medications (e.g., proton pump inhibitors, antipsychotics), 3. Medication access issues, 4. Lack of information and understanding of information, 5. Difficulties with medication administration, 6. Issues with medication suitability, 7. Adverse drug events (ADEs) and preventative measures, 8. Need for preventative care (e.g., vaccinations), and 9. Smoking cessation.^{6,13,17,24} Overall, studies show that an ICU-RC clinical pharmacist addresses the unmet medication-related needs of ICU survivors.

Ideally, the clinical pharmacist in an ICU-RC would be the critical care pharmacist practicing both in the ICU and ICU-RC. Critical care clinical pharmacists are recognized as integral members of the ICU team, and these pharmacists have extensive knowledge of PICS/PICS-F and disease states and treatments that put ICU survivors at risk of PICS and MRPs.¹⁸⁻²⁰ This places critical care clinical pharmacists in an ideal position for their role in ICU-RCs and to educate patients on potential

complications related to a patient's ICU stay. Therefore, critical care clinical pharmacists can help bridge the transition from inpatient to ambulatory care settings.

Description of Activities in ICU-RCs

Specific core activities determined by this consensus group of a clinical pharmacist in the ICU-RC include: 1. Comprehensive medication management (CMM) and disease evaluation, 2. Patient education and counseling, 3. Preventative care, 4. Transition of care activities, 5. Referral to other services, 6. Education to other health care professionals and learners, and 7. Other ICU-RC related activities. Details on each specific activity will be described below.

Comprehensive Medication and Disease Management

The ICU-RC clinical pharmacist caring for ICU survivors and caregivers ideally perform CMMs, consisting of a thorough evaluation of a patient's known disease states and all active medications. The CMM should include assessment of patient's medication-related needs, evaluation of patient's medication therapy by optimizing therapy (e.g., identifying and addressing MRPs, assessing efficacy and safety of each medication, assessing medication-taking behaviors), development and implementation of a care plan in collaboration with the patient and their providers, and performance of follow-up evaluations and provide medication monitoring plans.²⁵ Through CMM, the clinical pharmacist may identify opportunities for pharmacologic interventions. Pharmacologic interventions may include, but are not limited to, (1) Deprescribing; (2) Optimization of drug therapy associated with the patient's indication prior to ICU admission; (3) Assessment and tolerance of new medications initiated during the

ICU admission continued at discharge; (4) Evaluation of adherence and addressing issues with adherence; and (5) Pharmacologic treatment of complications associated with PICS.

Deprescribing

Patients who present for follow up in the ICU-RC often are prescribed complex medication regimens inclusive of home medications prior to admission, new acute and chronic medications as a result of the admission, and medications inappropriately continued from the hospitalization.²⁶ One study demonstrated approximately 50% of older adults during post-transition home care visits were observed to meet criteria for polypharmacy (5-9 prescribed medications) and almost 40% qualified for hyperpolypharmacy (greater than 10 prescribed medications).²⁷ Inappropriate continuation of medications from hospitalization has been shown to significantly increase the burden of medication regimens for this patient population.²⁸⁻³¹ Clinical pharmacists working within ICU-RCs are ideally suited to assess each patient's medication regimen for medications which were inappropriately continued after hospital discharge, in addition to potential simplification of medication regimens.

Therapy Optimization

The ICU-RC is an optimal setting for a clinical pharmacist to assess appropriateness of a patient's medication regimens for chronic disease states. Often, patients have been admitted to the ICU for a decompensation or exacerbation of a chronic condition, which may or may not have been appropriately managed prior to admission. An example of a clinical pharmacist intervention in this area is ensuring patients are on appropriate controller inhalers after an exacerbation of

asthma or chronic obstructive pulmonary disease. Additionally, a clinical pharmacist intervention could include initiation of chronic medications for disease states that may not have been restarted at hospital discharge depending on the patient's condition (e.g., antihypertensive medications for patients who were hypotensive at discharge). An ICU-RC clinical pharmacist can assess for appropriateness of restarting these medications in coordination with other specialists if needed. Data relating to preventing readmissions with clinical pharmacist intervention in an ICU-RC is lacking; however, reduction of readmissions has been previously demonstrated with clinical pharmacist intervention after hospital discharge.^{32,33}

Adverse Effect Assessment

Patients who present to ICU-RCs often have had multiple new medications initiated. The ICU-RC is an ideal setting to determine tolerance of these new medications with a focus on patients' potential ADEs. Additionally, clinical pharmacists can evaluate for ADEs as patients attempt to transition back to an out-of-hospital routine (e.g., changes in nutrition, sleep/wake cycles, and exercise/mobility). All of these routine changes could impact the ADE profile of medications. Clinical pharmacists in this setting can educate patients on whether these ADEs are typical and/or expected to be short in duration, highlight ways to mitigate these ADEs when possible, or facilitate changing medication regimens if ADEs are prohibitive.

Adherence Evaluation

Clinical pharmacists are crucial in assessing and educating patients on medication adherence. In groups of patients with chronic disease states (e.g., diabetes), pharmacist-led programs have

been shown to improve medication adherence.^{34,35} Clinical pharmacists should use tools to assist patients in achieving adherence, including pill boxes, medication adherence packaging, reminder alarms, and engaging supportive caregivers, if a need is identified. Clinical pharmacists should also assess whether patients have adequate medication storage areas and stress the importance of appropriately storing their medications. Additionally, patients should be counseled on correct time of administration and frequency of specific medications, and drug-drug and drug-food interactions. The post-ICU setting is also an opportunity to address patient's beliefs and perceptions about their medications that could be potential barriers to adherence. By putting patients at the center of these discussions, clinical pharmacists can encourage informed adherence and improve overall outcomes.

Treatment of Complications Associated with PICS

Patients with PICS often present with significant symptoms of cognitive impairment, major depressive disorder, anxiety, and post-traumatic stress disorder.^{4,5} Pharmacologic treatment is often a component of managing these complications, particularly use of antidepressants, anxiolytics, and anti-psychotics. Clinicians practicing in this setting may manage newly diagnosed or worsening depression and/or anxiety by referral to other services, initiation or titration of medications, and/or cognitive behavioral therapy. Clinical pharmacists in ICU-RCs can assist providers with multiple pharmacotherapy issues, including selection of appropriate agents and dosing, cross titration of one anti-depressant to an alternative, patient education and counseling, and/or deprescribing if necessary.

Patient Education and Counseling

Within ICU-RCs, clinical pharmacists are ideally placed to educate ICU survivors and caregivers about medication-related needs and problems, as well as appropriate medication storage and disposal. As an integral clinician on the interprofessional team, clinical pharmacists should provide patient-specific drug and disease state education during initial and follow-up visits. Following an ICU admission, patients' medications may have changed, new medicines may have been started, and some pre-hospital medicines may have been stopped.^{11,36-39} It is vital that patients and caregivers understand the reasons for these changes to ensure that they can make informed decisions about their care. Additionally, ICU-RC clinical pharmacists should educate ICU survivors and caregivers on potential complications related to a patient's ICU stay and the risk of PICS and PICS-F.

Preventative care

During an ICU stay, patients may receive treatment for a myriad of disease states. Some of these disease states and treatments may place them at increased risk for future complications. Preventive treatments can be considered in the ICU if appropriately identified; however, they may be deferred for multiple reasons. One of the main reasons vaccinations may not be administered in the ICU is the patient's immune status. Relative and overt immunosuppression are common findings in critically ill patients.⁴⁰ Live vaccines have the potential to cause disease in the immunosuppressed population. Patients may not be able to mount an appropriate immune response to vaccinations if they have primary or secondary immunodeficiencies.⁴¹ Fever may develop after vaccination and may be

misinterpreted as a new infection. Additionally, vaccination practices vary from institution to institution, with many opportunities for intervention.⁴²

This provides a clear opportunity for an ICU-RC clinical pharmacist to ensure patients' vaccinations are up to date. The ICU-RC clinical pharmacist should screen patients at each encounter for the following, which include, but are not limited to, vaccine status for influenza, varicella, meningococcal, pneumococcal, and *Haemophilus influenzae*. Other vaccination opportunities include hepatitis A and B, and tetanus, diphtheria, and pertussis. Particular focus should be paid to comorbidities and details of patients' ICU stay to ensure all eligible vaccines are identified and offered.

Transitions of Care Activities

The ICU-RC clinical pharmacist can play a vital role in the management of ICU survivors transferring from one setting to another (e.g., from hospital to home). In addition to medication-related education, clinical pharmacists can assist ICU survivors and caregivers with re-entering society and managing day-to-day tasks that can be impacted by PICS. One example includes educating patients on how they take their medications while managing their day to day tasks. Clinical pharmacists are also well positioned during these transitions to ensure therapy continuation by identifying these medications through medication reconciliation and by facilitating medication acquisition (e.g., assisting with prior authorizations, processing test prescriptions). Studies have shown that more accurate and comprehensive medication histories are obtained by pharmacy personnel compared with other health care professionals.^{43,44} In addition to medication reconciliation, ICU-RC clinical pharmacists should also liaise with patients' primary care and/or community clinical pharmacists to improve continuity of care.

Overall, ICU-RC clinical pharmacists can serve as an integral player to facilitate and address MRPs in ICU survivors during these transitions.

Recommendation for Referral to Other Services

A reciprocal relationship between clinical pharmacists and patients was described previously in which patients developed a reliance on the clinical pharmacist as a trusted health care professional.⁴⁵ It is through these relationships of trust and significance that clinical pharmacists may identify needs not previously identified by other members of the health care team. While the ideal ICU-RC model provides a holistic treatment approach to the ICU survivor's recovery, it is inevitable that all needs may not be adequately achieved through resources of the clinic. Through these patient-clinical pharmacist relationships, ICU-RC clinical pharmacists may be first to identify such needs. Examples may include recommending referrals to psychiatry for co-morbid psychiatric diagnoses or to a clinical nutritionist for malnutrition or an inadequate nutrition plan.

Education to Other Health Care Professionals and Learners

In 2012, SCCM released a report on the state of PICS and PICS-F in the U.S. identifying major gaps in knowledge regarding these complications, not only among the general public but also among health care and social service professionals and their learners.⁴ The statement called for increased awareness of PICS and PICS-F among these professionals. Additionally, providing increased awareness in the process of ICU recovery is crucial. Outpatient health care professionals may lack the knowledge they need to guide patients through ICU recovery, and identify and care for patients and caregivers who suffer from PICS and PICS-F. An ICU-RC clinical pharmacist is well positioned to provide education

regarding ICU recovery, and PICS management and its complications to these health care professionals. In addition to providing education on PICS management and its complications, inpatient ICU professionals should be educated on preventative measures that should be taken to reduce the risk of PICS, such as ICU protocols with the ABCDEF bundle (A, assess, prevent, and manage pain; B, both spontaneous awakening and spontaneous breathing trials; C, choice of analgesic and sedation; D, delirium: assess, prevent, and manage; E, early mobility and exercise; and F, family engagement and empowerment).⁴⁶ Critical care clinical pharmacists are well positioned to provide education on the importance of ICU protocols and to also maintain adherence to these protocols. This is a proven role of critical care clinical pharmacists in improving compliance with ICU protocols which prevent long-term functional disabilities associated with PICS.⁴⁷⁻⁵⁰

Other ICU-RC Related Activities

Other specific ICU-RC related activities of an ICU-RC clinical pharmacist includes: 1. Development of inclusion criteria for ICU-RC, 2. Assist in screening patients during inpatient ICU rounds, 3. Identify risk factors associated with PICS, and 4. Select patients for the clinic. Patient selection for the clinic is often based upon identification of risk factors for PICS including mechanical ventilation, vasopressor requirements, receipt of neuromuscular blockade, episode(s) of delirium during inpatient stay, and prolonged ICU stay.¹³ While inclusion criteria for which patients are seen within the ICU-RC may vary between institutions, efforts should be made to determine which patients may benefit the most from ICU-RCs.

Additionally, much remains to be learned about medication risks and needs in ICU survivors and caregivers. Clinical pharmacists' roles in medication management following critical illness needs to be evaluated in large, multicenter, global studies. Further research needs to be conducted and potential areas of research are listed in Table 3.

Developing a Position Proposal for the ICU-RC Clinical Pharmacist

The proposal for the ICU-RC clinical pharmacist position should include a clear definition of the position which consists of the justification of the position, specific functions and responsibilities (outlined previously), and budget considerations. Justification of the position should include: 1. Description of the rationale and significance of the patient care problem, including existing gaps in care, 2. Evaluation of institutional data on ICU survivors, if available, 3. Review of institutional and department of pharmacy mission statements, and 4. Review of organizational statements that support the need for expanding pharmacy services. As described previously, ICU survivors face many gaps in care and these present unique opportunities for clinical pharmacy service development in the area of ICU recovery. In addition to gaps in care, consider requesting institutional data showing annual ICU admission and readmission rates to the hospital attributed to these patients.

Review of various statements (institutional, departmental, and organizational) should be included in the proposal. Review of institutional and department of pharmacy mission statements may reveal important terminology useful in justification of the position. Recommendations provided by organizations, such as the Meaningful Use Criteria, SCCM Thrive, and Centers for Medicare and Medicaid Services (CMS), can be used as justification for an ICU-RC clinical pharmacist position.^{15,51}

Meaningful use is criteria for the use of electronic health records (EHRs) and the goal is “to promote the spread of [EHRs] to improve health care in the United States”.⁵¹ Clinical pharmacists in ICU-RCs can help institutions meet their meaningful use criteria through developing clinical decision support and clinical quality measures with medication-related criteria, focusing on transitions of care and gaps in care, evaluating immunizations, and providing timely medication reconciliation.⁵¹ A useful resource supporting the need for ICU-RC care is the SCCM THRIVE website.¹⁵ The CMS requirement continues to evolve and includes metrics for coordinated care, transitions of care, and documentation of clinical reconciliation within EHRs. A clinical pharmacist participation in a dedicated ICU-RC will be an important contributor to these metrics including medication reconciliation and immunizations.

In addition to organizational statements, the growing body of evidence in CMM is an excellent source of data to justify an ICU-RC clinical pharmacist position.⁵² The American College of Clinical Pharmacy (ACCP), the American Association of Colleges of Pharmacy, and the College of Psychiatric and Neurologic Pharmacists have invested resources to fund research, education, and practice initiatives supporting implementation of CMM.⁵³ Useful resources for justification of ICU-RC clinical pharmacist positions are outlined in Table 4.

Within the ICU-RC clinical pharmacist position proposal, it is important to also include budget and cost considerations associated with the position. It will be necessary to detail projected costs including salary/hour and total hours for a clinical pharmacist (or percent effort). These costs should be compared with projections of relatable costs incurred from PICS, ICU recovery, and readmissions. This may require additional information on either local readmissions related to MRPs, or citing published

literature. Additionally, a return on investment strategy should be developed including annual milestones and metrics designed collaboratively with administrators. Prior to engaging management, work with physician and nursing staff in the clinic to design reasonable expected outcomes over a defined time period. These team members are well positioned to assist in identifying billable mechanisms and “value added” (services provided that could impact medication outcomes).

Implementing primary care clinical pharmacy services to align with value-based payment models has been described and could be used for ICU-RC clinical pharmacist reimbursement discussions.⁵⁴ Generally, by including a clinical pharmacist in the clinic, this will allow other team members to focus more directly on assessment, physical exams, and MRPs identified during the clinical pharmacist-patient interaction. Additionally, the clinical pharmacist may be available for patient follow-up and serve as an effective triage source during the outpatient recovery period. It is reasonable to discuss a “buy in” period for scaling up involvement over time. It is not uncommon for a new service to require 3-5 years to show a full return on investment, so consider including annual milestones showing the progress.

Planning for and Implementation of the ICU-RC Clinical Pharmacist Position

Once the position proposal is approved by key stakeholders, further planning and implementation of an ICU-RC clinical pharmacist position should occur. During the implementation process, it is important to: 1. Measure key metrics, 2. Outline resources needed for the position, and 3. Evaluate and address barriers that may occur during implementation of the position.

Implementing services within existing physician practices facilitates ease of communication, collaboration, and measurement of key quality metrics. Metrics such as medication interventions per patient encounter, medication adherence, and mortality and readmission rates should be identified a priori and recorded routinely for continuous quality improvement to evaluate and improve services and substantiate the clinical pharmacist role. To be able to collect and evaluate these metrics, it is crucial for ICU-RC clinical pharmacists to document all MRPs identified and interventions conducted during their interactions with patients and other health care professionals.

In addition to metrics, institutional resources to support salary and benefits of the ICU-RC clinical pharmacist will be required. Partnerships and job sharing with existing critical care clinical pharmacist positions and pharmacy school faculty can be creative solutions to support burgeoning efforts while data is garnered to support additional resources from institutional leadership. Clinical pharmacists can extend their patient care reach by utilizing layered learning with student pharmacists and pharmacy residents as pharmacist extenders. This model both enriches the learners' education and increases patient care encounters each clinical pharmacist may have.⁵⁵

Other resources should also be considered which include: adequate private space to care for patients; access to electronic or paper health records for patient information gathering and documentation of clinical services; access to drug information resources, computer, telephone and means of communicating recommendations to collaborating health care professionals. The location of the space to care for patients should be large enough to accommodate a patient with or without caregiver(s). Procedures for office staff to schedule patients and communicate patient needs to the

clinical pharmacist when they are off-site should be developed. Teleconferences provided by ICU-RC clinical pharmacists may be an option to provide education and a resource for patients at off hours, and/or when the clinical pharmacist is off-site, or for patients residing in rural areas. In addition to resources for ICU-RC clinical pharmacists, resources for ICU survivors and caregivers should be developed and provided at the initial clinic visit. Education materials tailored to post-ICU recovery provided by the American Thoracic Society⁵⁶ and PICS/PICS-F are necessary and can supplement the teaching material provided by SCCM Thrive's website.¹⁵

Barriers to effectively implementing an ICU-RC clinical pharmacist position must be noted and overcome. Some of these barriers have been reported in a recent study.²³ Time, resource allocation, health care professionals' awareness of clinical pharmacists' value and expertise in ICU recovery, clinical pharmacists' confidence and skill, and medical record documentation can all be potential barriers that must be planned for and addressed. Some health care professionals may not be aware of the clinical pharmacists' value in caring for ICU survivors and caregivers. Clear communication, scope of practice, and involvement of these health care professionals in the planning process are important to demonstrate the value of clinical pharmacists in caring for ICU survivors and caregivers and to avoid negative interactions. A collaborative, interprofessional approach to the management of PICS and ICU recovery is encouraged. Collaborative practice agreements and institutional protocols could facilitate active clinical pharmacists involved in caring for these patients. In addition to lack of provider awareness of clinical pharmacist's value in ICU recovery, clinical pharmacists may lack the expertise and confidence to manage ICU survivors and caregivers without appropriate training or mentoring. The

costs and logistics can be substantial to develop and train these clinical pharmacists. Suggested training and options to address clinical competencies in ICU recovery are outlined in the next section.

Provider billing capabilities by clinical pharmacists are still limited and can be potential barriers that must be addressed and planned for.²¹ Interstate variation with respect to clinical pharmacist provider status may dictate resources available for the provision of clinical services. In addition to provider status, prescriptive privilege is an expanded area of a pharmacist's scope of practice but can vary between institutions. For example, clinical pharmacists practicing in the Veterans Affairs Health System may have additional prescriptive privileges with scope of practice. Many opportunities for collaborative practice exist for all clinical pharmacists within existing provider practice models; yet clinical pharmacists will be called to prove their value in cost avoidance, patient experience, and clinical outcome metrics to substantiate their salary. It can be done but does require time to show outcomes.²²

Potential solutions could be implemented to address some of these barriers. As health care systems transition from fee-for-service to value-based care, when clinical pharmacists document their interventions and outcomes successfully, positions can be successfully substantiated through collaborative practice. Interprofessional collaboration will be essential to ensure the success of the patient, entire clinical team, and viability of the health care system as a whole. Efforts to optimize care transitions are paramount as models of care are redesigned to emphasize home-based care. Clinical pharmacists in ICU-RCs are uniquely poised to play a pivotal role in this transition.^{22,57}

Competency and Training of the ICU-RC Clinical Pharmacist

Clinical pharmacists may lack the expertise and confidence to manage ICU survivors and caregivers without appropriate training or mentoring. Clinical pharmacists providing care to ICU survivors and caregivers should demonstrate competency in the knowledge and skills to serve this unique population. Suggested training and competencies of the ICU-RC clinical pharmacist are outlined in Table 5. Postgraduate training will provide a foundation for providing clinical services to patients in various settings. However, specific experiences in caring for ICU survivors and caregivers may be limited or not available throughout postgraduate training. Therefore, it is crucial for postgraduate training, especially critical care pharmacy residency programs, to include experiences and opportunities to care for these patients. The experiences could include required rotations in ICU-RCs (if available) or ambulatory care transitions of care pharmacy services with a focus on ICU survivors. If these opportunities are not available during postgraduate training, clinical pharmacists should be provided the opportunity to shadow established ICU-RC clinical pharmacists, or at a minimum, provide other experiences (i.e., conference programming on ICU recovery) to ensure that clinical pharmacists obtain essential information before providing proficient pharmaceutical care to these patients and caregivers. Training or mentoring by an ICU-RC clinical pharmacist is ideal.

In addition to training, board certification by the Board of Pharmacy Specialties in Critical Care Pharmacy or associated specialty is strongly preferred. The path to board certification is outlined on the Board of Pharmacy Specialties website⁵⁸ (see Table 4 for the website). Additionally, clinical pharmacists should demonstrate excellent communication and interpersonal skills, especially in working as part of an interprofessional team. Active participation in professional societies leading the development of this

clinical realm, such as ACCP and SCCM, is essential for a candidate's professional and practice development.

Conclusions

Due to ICU survivors' health complexity and challenges associated with their care, clinical pharmacist involvement in ICU-RCs is crucial. There is a shortage of clinicians to manage and treat ICU survivors and caregivers, and this gap in the health care system is an opportunity for increased involvement by clinical pharmacists. Additionally, the field of ICU recovery is rapidly evolving, and an interprofessional approach will be required to judiciously, and effectively, guide treatment of ICU survivors and caregivers. Clinical pharmacists in ICU-RCs can play a critical role within the interprofessional team to promote education on PICS and PICS-F, improve medication adherence, facilitate appropriate referrals to PCPs and specialists, ensure CMMs and medication reconciliation, provide assessment of inappropriate and appropriate medications after hospitalization, address ADEs, MEs, and drug interactions, promote preventive measures, and facilitate medication acquisition and logistics with the goal of improving patient outcomes and reducing health care system costs. With the expanding role of clinical pharmacists through collaborative practice agreements, provider designations, and billing privileges, clinical pharmacists practicing within ICU-RCs will continue to expand and evolve.

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Table 1. Demographics and Description of Current Clinical Pharmacy Services in Intensive Care Unit-Recovery Clinics²³

Clinical Pharmacists Characteristics	n=9
Education Completed, n (%)	
Doctor of Pharmacy (Pharm.D.)	8 (89)
PGY-1 Pharmacy Practice Residency	8 (89)
PGY-2 Critical Care Residency	7 (78)
Both PGY1 and PGY2	7 (78)
Fellowship Training	1 (11%)
Master's Degree in Clinical Pharmacy	1 (11%)
Average Number of Years in Practice, years \pm SD (range)	16.5 \pm 13.5 (2-38)
Board Certification	
BCPS	1 (11%)
BCCCP	1 (11%)
BCNSP	1 (11%)
Both BCPS and BCCCP	4 (44%)
ICU-RCs Characteristics	n=9
Location, n (%)	
Academic Medical Center	9 (100%)
Additional Affiliation with Community Hospital	1 (11%)
Type of ICU Patients, n (%)	
Medical	8 (78%)
Surgical	1 (11%)

Cardiac	1 (11%)
Team Members, n (%)	
Pulmonology/Critical Care and Anesthesia/Critical Care Physicians	9 (100%)
Nurse	7 (78%)
Physical Therapist	4 (44%)
Social Worker	4 (44%)
Occupational Therapist	3 (33%)
Respiratory Therapist	3 (33%)
Nurse Practitioner	2 (22%)
Case Manager	2 (22%)
Communication Methods, n (%)	
Face-to-Face	9 (100%)
Case conference	4 (44%)
Email	3 (33%)
Written Documentation via EHR	2 (22%)
Teleconference	2 (22%)
Clinical Pharmacist Roles, n (%)	
Direct Patient Care	9 (100%)
Research	8 (89%)
Clinic Design	4 (44%)
Clinic Governance or Administration	4 (44%)
Patient Selection and Enrollment	1 (11%)

Direct Patient Care Activities, n (%)	
Conducted Medication Reconciliation (always)	78%
Identified and Addressed Need for Medication Education (often or routinely)	89%
Identified and Addressed Medication Adherence Problems (often or routinely)	78%
Identified and Addressed Adverse Drug Effects (often or routinely)	78%
Identified and Addressed Subtherapeutic Medication Dosing (often or routinely)	56%
Identified and Addressed Medication Use Without An Indication (often or routinely)	44%
Identified and Addressed Failure To Receive Medication After Hospital Discharge (often or routinely)	44%
Identified and Addressed Need For Preventive Interventions (often or routinely)	44%

BCCCP = Board Certified Critical Care Pharmacist; BCNSP = Board Certified Nutrition Support Pharmacist;

BCPS = Board Certified Pharmacotherapy Specialist; EHR = electronic health record; ICU = intensive care

unit; ICU-RC = intensive care unit-recovery clinic; PGY-1 = post-graduate year one; PGY-2 = post-

graduate year two; SD = standard deviation.

Table 2. Description of Clinical Pharmacy Activities in Intensive Care Unit-Recovery Clinics

- Comprehensive medication and disease evaluation
- Patient education and counseling
- Adherence evaluation
- Preventive care
- Transitions of care activities
- Referral to other services
- Documentation
- Education to health care professionals and learners
- Development of tools and reference regarding Post-ICU Care and PICS/PICS-F
- Research

ICU = intensive care unit; PICS = post-intensive care syndrome; PICS-F = post-intensive care syndrome family.

Table 3. Research Needs in Intensive Care Unit-Recovery Clinics

- Association of medications administered in the ICU and PICS
- Long-term patient outcomes post-ICU hospital discharge
- Effects of patient comorbidities and their association with medication management during ICU recovery needs
- Pharmacoeconomic impact of ICU-RC clinical pharmacist's interventions
- Impact of multiple follow-up visits with ICU survivors and caregivers

ICU = intensive care unit; ICU-RC = intensive care unit-recovery clinic; PICS = post-intensive care syndrome.

Table 4. Resources for Intensive Care Unit-Recovery Clinics and Post-Intensive Care Unit Care

- **Connect With Patients and Families:** <https://www.sccm.org/MyICUCare/THRIVE/Connect-With-Patients-and-Families>
- **THRIVE:** <https://www.sccm.org/Research/Quality/THRIVE>
- **Comprehensive Medication Management in Team-Based Care:**
<https://www.accp.com/docs/positions/misc/CMM%20Brief.pdf>
- **Figuring Out Comprehensive Medication Management:**
<https://www.aacp.org/article/figuring-out-comprehensive-medication-management>
- **Comprehensive Medication Management (CMM) Guide:** <https://cnpn.org/guideline/cmm>
- **Critical Care Pharmacy:** <https://www.bpsweb.org/bps-specialties/critical-care-pharmacy/>

Table 5. Suggested Training and Competencies of the Intensive Care Unit-Recovery Clinics Clinical Pharmacist

Training and Competencies
Post-graduate year 1 pharmacy practice residency in a hospital setting
Post-graduate year 2 critical care pharmacy residency
Board certification in critical care medicine or associated specialty
Other clinical competencies: <ul style="list-style-type: none">• Comprehensive medication management and consideration in the context of ICU recovery• Risk factors associated with, identification of and management of PICS/PICS-F• ICU recovery process and complications related to recovery• Evaluation of and management of mental health conditions• Evaluation of and management of cognitive impairment

ICU = intensive care unit; PICS = post-intensive care syndrome; PICS-F = post-intensive care syndrome family.