CHAPTER 11

ACUTE CARE PRACTICE

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Abstract

Acute care pharmacy practice addresses complex medication needs in hospitalized patients through specialized knowledge, rapid intervention, and interdisciplinary collaboration across diverse clinical environments. Critical care pharmacotherapy optimizes life-sustaining medications including vasopressors, antimicrobials, sedatives, and nutrition support through precise pharmacokinetic dosing, advanced monitoring, and pathophysiologic-based decision-making in critically ill patients. Emergency medicine services provide time-sensitive medication management for trauma, cardiovascular emergencies, toxicological exposures, and acute exacerbations requiring rapid assessment, prioritization, and intervention coordination. Internal medicine practice addresses complex multimorbidity through comprehensive medication management, transitions of care coordination, and antimicrobial stewardship integrating evidence-based approaches with patient-specific factors. Surgical care management encompasses perioperative medication optimization, antimicrobial prophylaxis, thromboembolism prevention, and enhanced recovery protocols promoting favorable surgical outcomes while preventing complications. Pain management strategies implement multimodal analgesia, opioid stewardship, and patient-specific approaches addressing acute, chronic, and procedural pain through appropriate medication selection, administration techniques, and monitoring protocols. This specialized practice area requires advanced clinical knowledge, rapid decision-making, and effective interdisciplinary communication to optimize medication therapy in acutely ill patients.

Keywords: *Hospital Pharmacy Practice, Critical Illness Pharmacotherapy, Perioperative Medication Management, Antimicrobial Stewardship, Emergency Pharmaceutical Care*

Learning Objectives

After completion of the chapter, the learners should be able to:

- Apply specialized pharmacotherapy knowledge to optimize medication therapy in critically ill patients including vasopressor selection, antimicrobial management, and nutrition support.
- Implement emergency medication protocols for time-sensitive conditions including cardiac arrest, stroke, sepsis, and toxicological emergencies.
- Develop comprehensive medication management approaches for complex internal medicine patients with multiple comorbidities and polypharmacy issues.
- Optimize perioperative medication management including antimicrobial prophylaxis, thromboembolism prevention, and transition planning for surgical patients.
- Implement multimodal pain management strategies balancing effective analgesia with appropriate opioid stewardship and adverse effect prevention.
- Participate effectively in interprofessional rounding and decision-making processes within acute care settings.

CRITICAL CARE

Vasopressor selection addresses different shock states through targeted pharmacological effects: norepinephrine as first-line for most shock types due to balanced alpha/beta effects, vasopressin for catecholamine-resistant vasodilatory shock, epinephrine for cardiogenic shock with low cardiac output, and phenylephrine for specific situations requiring pure alpha-adrenergic effects. Inotropic therapy implementation supports cardiac output in cardiogenic shock or cardiac dysfunction through agents including dobutamine (primarily beta-1 effects improving contractility), milrinone (phosphodiesterase inhibition with combined inotropic and vasodilatory properties), or epinephrine (combined inotropic and vasopressor effects for profound shock). Continuous infusion management establishes standardized concentrations, compatibility evaluation, and titration protocols with clearly defined hemodynamic targets including mean arterial pressure goals, cardiac index targets, or peripheral perfusion parameters.

Mechanical Ventilation Support

Sedation strategy development emphasizes targeted light sedation with daily interruption protocols to minimize ventilator duration and

delirium risk, selecting appropriate agents including propofol (rapid onset/offset but hypotension risk), benzodiazepines (effective but delirium association), or dexmedetomidine (preserved respiratory drive but bradycardia concerns). Analgesia optimization implements appropriate pain control essential for ventilator tolerance and patient comfort while minimizing respiratory depression through opioid selection, adjunctive agents, and regular reassessment using appropriate scales for non-verbal patients. Neuromuscular blockade management addresses appropriate indications including refractory hypoxemia, ventilator dyssynchrony, and elevated intracranial pressure, with monitoring for complications including prolonged weakness and adequate concurrent sedation.

Infection Management

Empiric therapy selection addresses likely pathogens based on infection site, hospital ecology, and patient risk factors for resistant organisms, while balancing broad coverage against antimicrobial stewardship principles particularly important in critically ill patients where inadequate initial therapy significantly increases mortality. Pharmacokinetic/pharmacodynamic optimization employs extended infusions for time-dependent antibiotics (beta-lactams), appropriate loading doses for hydrophilic agents in fluid-shifted patients, and therapeutic drug monitoring for narrow therapeutic index antimicrobials (vancomycin, aminoglycosides) accounting for critical illness alterations in drug disposition. De-escalation protocols guide systematic narrowing of antimicrobial coverage based on culture results, clinical response, and biomarker trends, ensuring appropriate stewardship without compromising patient outcomes.

Table 11.1: Critical Care Pharmacy Interventions

Clinical Focus	Assessment Parameters	Pharmacist Interventions	Outcome Measures
Hemodynamic Support	MAP, CO/CI, vasopressor doses, hemodynamic monitoring, tissue perfusion	Vasopressor selection/titration, inotrope optimization, fluid resuscitation support	Time to MAP goals, vasopressor weaning success, organ perfusion markers
Respiratory Support	Ventilation parameters, oxygenation, sedation requirements, lung mechanics	Sedation/paralytic protocols, lung-protection, ventilator-associated pneumonia prevention	Ventilator days, successful extubation rates, sedation goal achievement, VAP rates

Antimicrobial Therapy	Culture results, susceptibilities, PK/PD parameters, infection markers	Empiric therapy selection, de-escalation, dose optimization, therapeutic drug monitoring	Clinical cure rates, pathogen eradication, resistance development, C. difficile rates
Renal Replacement	RRT modality, drug clearance, dosing adjustments, fluid status	Medication dosing during CRRT/HD, replacement fluid composition, drug removal assessment	Medication-related adverse events, therapeutic goal achievement, fluid balance targets
Nutrition Support	Metabolic requirements, feeding tolerance, micronutrient status	TPN formulation, enteral feeding optimization, drug-nutrient interactions	Nitrogen balance, prevention of refeeding syndrome, nutritional goal achievement
Neurologic Emergencies	ICP, cerebral perfusion, seizure activity, neurologic assessment	Brain injury protocols, anti-seizure therapy, neuroprotective strategies	ICP control, seizure prevention, neurologic outcome measures, Glasgow outcome score
Toxicology Management	Toxidrome recognition, decontamination needs, antidote requirements	Antidote selection/dosing, enhanced elimination strategies, supportive care	Time to clinical improvement, complication rates, successful decontamination
Trauma/Burn Care	Injury severity, resuscitation status, coagulation, metabolic demands	Massive transfusion support, coagulation management, hypermetabolic management	Resuscitation goal achievement, complication rates, wound healing metrics

Neurologic Emergencies

Acute ischemic stroke management implements time-sensitive protocols for thrombolytic therapy including alteplase dosing (0.9 mg/kg, maximum 90mg), inclusion/exclusion criteria assessment, blood pressure management (≤185/110 mmHg before treatment, ≤180/105 mmHg during/after), and post-thrombolytic monitoring for hemorrhagic transformation. Status epilepticus treatment follows

stepwise progression from benzodiazepines (lorazepam, midazolam) to loading doses of antiepileptic drugs (fosphenytoin, valproate, levetiracetam) and potentially to anesthetic infusions (midazolam, propofol, ketamine, pentobarbital) for refractory cases. Intracranial pressure management employs osmotic agents (mannitol, hypertonic saline) with precise osmolality targets and timing, while minimizing medications exacerbating intracranial hypertension through appropriate selection and dosing.

Renal Replacement Therapy

Drug removal assessment evaluates medication characteristics affecting dialyzability, including molecular weight (<500 Da more readily removed), protein binding (<80% binding increases removal), volume of distribution (<0.7 L/kg more significantly affected), and existing clinical dialysis data guiding therapy adjustments. Dosing strategy implementation addresses different replacement modalities including supplemental doses after intermittent hemodialysis, continuous renal replacement therapy adjustments based on effluent rates, and hybrid approaches for prolonged intermittent therapies requiring different considerations than conventional methods. Administration timing coordination positions critical medications relative to dialysis sessions, administering highly dialyzable drugs after treatment while scheduling pre-dialysis medications requiring controlled removal.

Nutrition Support

Parenteral nutrition formulation designs patient-specific macronutrient and micronutrient compositions based on metabolic requirements, organ function, and disease state, with particular attention to modified requirements in critical illness including appropriate protein provision (1.2-2.0 g/kg/day), moderate caloric delivery avoiding overfeeding, and electrolyte adjustments accounting for organ dysfunction. Enteral therapy selection addresses specialized formulation needs for specific conditions including renal failure (reduced electrolytes, modified protein), hepatic encephalopathy (branched-chain amino acid enrichment), respiratory insufficiency (modified carbohydrate:fat ratio), and hyperglycemia (diabetes-specific formulations) beyond standard enteral nutrition. Medication-nutrition interaction management prevents physical incompatibilities, absorption alterations, and metabolic effects when medications and nutrition therapies are co-administered.

Toxicological Emergencies

Decontamination approach selection evaluates appropriate interventions including activated charcoal for recent ingestions of absorbable toxins, whole bowel irrigation for extended-release preparations or body packers, or various enhanced elimination techniques based on specific toxin characteristics, timing, and patient condition. Antidote selection and dosing addresses specific toxins with available reversal agents, including N-acetylcysteine for acetaminophen, naloxone for opioids, flumazenil for benzodiazepines (with appropriate seizure precautions), digoxin-specific antibody fragments for cardiac glycosides, and various chelating agents for heavy metals. Enhanced elimination implementation considers hemodialysis for toxins meeting criteria of low molecular weight, low protein binding, small volume of distribution, and limited endogenous clearance, including substances like methanol, ethylene glycol, salicylates, and lithium.

Multidisciplinary Team Integration

Daily interdisciplinary rounds incorporate pharmacist medication review, therapeutic recommendations, and intervention planning as standard components rather than consultative add-ons, with pharmacist participation demonstrating significant reductions in preventable adverse drug events and improved adherence to quality measures. Protocol development leadership engages pharmacist expertise in creating standardized approaches to common critical care scenarios including sedation management, glycemic control, and thromboprophylaxis, establishing evidence-based interventions while reducing unnecessary practice variation. Emergency response team participation includes pharmacist presence during cardiac arrests, trauma activations, and other time-sensitive emergencies requiring immediate medication management and preparation.

EMERGENCY MEDICINE

Resuscitation Pharmacotherapy

Code response responsibilities include medication preparation, dose calculation verification, administration timing recommendations, and documentation during cardiac arrest resuscitation, with ACLS algorithm adherence enhanced by pharmacist participation ensuring appropriate drug selection, dosing, and sequence during high-stress situations. Rapid sequence intubation support involves preparing appropriate induction and paralytic agents based on patient-specific factors including hemodynamic stability, neurologic status, and difficult airway

characteristics, selecting between etomidate, ketamine, propofol, or midazolam paired with appropriate neuromuscular blockers. Post-cardiac arrest care implements targeted temperature management protocols, vasopressor optimization, and neuroprotective strategies including appropriate sedation and seizure prophylaxis following return of spontaneous circulation.

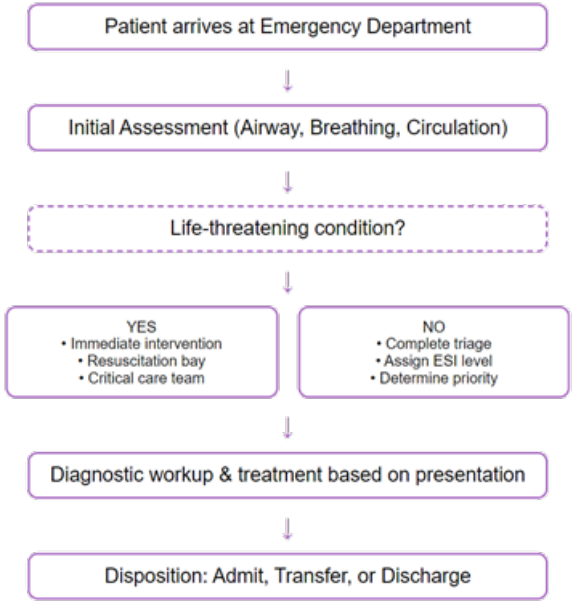

Figure 11.1: Emergency Medicine Triage Algorithm

Time-Sensitive Condition Management

Acute coronary syndrome protocols include appropriate antiplatelet loading (aspirin plus P2Y12 inhibitor), anticoagulation initiation (unfractionated heparin, enoxaparin, or bivalirudin), and preparation for emergent procedures with attention to timing and dosing precision, particularly for STEMI requiring immediate reperfusion. Stroke management involves tissue plasminogen activator (tPA) preparation, inclusion/exclusion criteria review, blood pressure management, and hemorrhagic transformation monitoring, with door-to-needle time targets under 60 minutes requiring efficient pharmacist integration into stroke teams. Status epilepticus intervention follows stepwise algorithms requiring rapid sequential medication administration when initial therapies fail, with pharmacist preparation of multiple agents