Critical Care Clinical Pharmacy Practice in the USA: Focus on BWH, Boston, MA

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Disclosures

- I have no disclosures of any of the information on this topic.
Gracias por la invitación. es un honor hablar con usted hoy.
An Opinion Paper Outlining Recommendations for Training, Credentialing, and Documenting and Justifying Critical Care Pharmacy Services


In 2000, the Society of Critical Care Medicine (SCCM) and the American College of Clinical Pharmacy (ACCP) published a position paper that defined critical care pharmacy services as fundamental, desirable, and optimal. A task force was developed that included individuals who are members of the ACCP Critical Care Practice and Research Network, the SCCM clinical pharmacy and pharmacology section, and the American Society of Health-System Pharmacists to develop an opinion paper with three primary objectives: to provide recommendations for the level of preparation and training of pharmacists to practice in critical care, to develop recommendations for the credentialing of pharmacists providing critical care services, and to develop mechanisms for documenting and justifying intensive care unit (ICU) pharmacy services. Each objective was addressed to accommodate the levels of services defined as fundamental, desirable, or optimal,
Overview

- Description of BWH and the pharmacy department
- Clinical services provided in the ICU
- Expectations of our ICU pharmacists
- Software support
- Importance of board certification
Description of BWH and the Pharmacy Department

- 800 bed Academic Medical Center
  - 102 adult ICU bed
    - MICU - 20
    - SICU - 10
    - Thoracic ICU - 10
    - Cardiac Surgery ICU - 22
    - Cardiac Medicine ICU - 10
    - Burn/Trauma ICU - 10
    - Neuroscience ICU - 20
  - About 70 Pharmacists
    - 15 with a focus on Critical Care
      - 8 pharmacist rounding in the ICU per day
BWH Clinical Pharmacy Metrics

- 43 Board Certified Pharmacists
- 24 hour, 7 day a week clinical coverage
- Rounding on over 18 teams house-wide daily
- Over 20,000 accepted clinical intervention annually
- Over 130 pharmacy students precepted annually
- Over 40 multidisciplinary teaching seminars annually
- Over 45 peer-reviewed manuscript published annually
- Over 50 national and regional presentations annually
The BWH Model

- ICU Pharmacy Practice vary in the USA
  - Focus on BWH Model
- Decentralized clinical pharmacists
- Integration of clinical and operational duties
  - Shared practice throughout the department
  - Duties include: computer order entry, rounds, presentations, student activities, collaboration with other healthcare professionals, oversight of delivery and omnicell problem resolution
Decentralization

- Monday through Friday: 7:00 AM- 3:30 PM
- Locations
  - ICU
  - Step/down
- Direct contact with other health care professionals
  - Nurses
  - Physicians
  - Respiratory Therapists
  - Physical Therapists
  - Nutritionists
Clinical Pharmacy Services
Intensive Care Units (ICU)

- Neonatal ICU (1 pharmacist)
- Medical ICU (2 pharmacists)
- Surgical ICU (1 pharmacist)
- Burn/Trauma ICU (1 pharmacist)
- Cardiac Surgery ICU (1 pharmacist)
- Neurology ICU (1 pharmacist)
- Thoracic ICU (1 pharmacist)
- Coronary Care Unit (1 pharmacist)
Inpatient Roles and Responsibilities

- **Daily Rounds**
- **Computer order entry approval process** – continuous 24/7
- **Documentation of interventions and adverse event reporting**
- **Clinical initiatives – some examples**
  - Aminoglycoside Monitoring and other Therapeutic monitoring
  - Targeted discharge teaching
  - Clinical monitoring program
- **Cost containment initiatives**
  - Target drug initiatives/stewardship
    - IVIG, Dexmedetomidine, albumin, chlorthiazide, direct thrombin inhibitors
  - IV to PO
- **Preceptorship of pharmacy students/residents**
- **Scholarship**
  - Medication utilization evaluations (MUEs)
  - Presentation of research/reviews
  - Publications
Expectations of Clinical Pharmacist Specialist

- **Clinical Specialist: Objective Requirements**
  - P&T Newsletters (1) written/year
  - Research Participation (1)
  - Peer reviewed articles published/year (1)
  - CEU programs presented/year (2)
  - Prepare a journal club review, in-service, or case study for the 3pm pharmacist meeting
    - At least 6 per quarter or 24/year
  - Precepting responsibly
    - Typically 8 month/year
Expectations of Clinical Pharmacist Specialist

- Clinical Specialist: Requirements
  - Leader within the department
    - Lead educational programs within department
    - Create new target drug initiatives
    - Go-to person
  - Leading throughout hospital
    - Interdisciplinary projects
    - Interdisciplinary committees
Clinical Pharmacist Practice
Topic intervened on by ICU pharmacist

- PAD
  - ICU sedation
- Glucose
- Hemodynamics
  - What pressor
  - Steroids
- Prophylaxis
  - Stress ulcer
  - VTE
  - Ventilator PNA
- Selection and Dosing of antimicrobials
- Therapeutic monitoring medication
- Drug-drug interaction
Clinical Pharmacy Consults: CPC’s

- Documentation of clinical interventions through Adult RX system
  - Monitoring
  - Alteration of drug regimens
  - Cost effectiveness

- Documented intervention last year
  - 20,000
Pharmacy Drug Initiatives: 
*Aminoglycoside Dosing*

- Daily reporting of patients on aminoglycosides
- Pharmacist dosing recommendations
- Monitoring
  - Drug levels
  - Renal function
  - Efficacy and Safety variables
Result of Pharmacist Aminoglycoside Program

Pharmacist-Driven Aminoglycoside Quality Improvement Program

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Summary
Our objective was to determine the impact of a pharmacist-driven aminoglycoside quality improvement program on the dosing methods of aminoglycosides at our institution. We assessed our current quality through retrospective review of all patients receiving aminoglycosides during a 5-month period. We then developed and implemented a pharmacist-driven aminoglycoside dosing program and prospectively assessed patients during a matched 5-month period. Two hundred and sixteen patients were evaluated, 87 pre-program and 129 post-program. Prior to standardized pharmacist intervention, 44% of patients achieved optimal therapy. Post implementation, patients achieving optimal therapy increased to 80% (p < 0.001). Patients in the pre-program group had a higher rate of acute change in renal function compared to the post-program group.

Resources are important

- Online Resource of Drug Information
- Pharmacy Drug Administration Guidelines
  - Drug Description
  - Indication and Dosage
  - Monitoring Parameters
- Intravenous Dilution Guidelines
- Drug Intravenous Push Guidelines
- Antimicrobial Agents Renal Dosing Guidelines
Clinical Guideline management of high cost drugs
Cost Containment Landscape
Financial Role of Clinical Pharmacist at BWH

- Cost consciousness, is necessary to contain budgets and meet fiscal goals
  - Total health care cost, include:
    • Length of stay, acuity of care, cost of adverse drug reactions, and acquisition cost of medication
Financial Role of Clinical Pharmacist at BWH

Prescribing guidelines may be necessary
  – Prevent inappropriate use
  – Promote use if appropriate

• Target Drug Initiatives
  – Clinical Interventions performed pharmacists
  – Example 2009 = Chlorothiazide IV ~ $275.00 per dose
  – Change to PO save ~ $100,000/year
    » Not easy, clinical pharmacist responsibility to enforce
Pharmacy Drug Initiatives: 
**IV to PO Antimicrobial Conversion**

- Daily antibiotic review for pharmacists
- Changes in patient status may qualify them for a change from IV medication to PO medication
- Significant cost savings for patients
Examples

- Dexmedetomidine Stewardship
- Inhaled epoprostenol (Veletri) – NO or Flolan
- IVIG IBW
- Stability of regular human insulin

Impact of ideal body weight dosing for all inpatient i.v. immune globulin indications

Intravenous immune globulin (IVIG) therapy is given to replace low immune ABW. Grams averted was calculated as the theoretical IVIG dose minus the dose

Table 2. Secondary end points.

<table>
<thead>
<tr>
<th>End point</th>
<th>INO (n = 53)</th>
<th>EPO (n = 52)</th>
<th>P</th>
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<tbody>
<tr>
<td>Mean insulin concentration</td>
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Overall, this initiative resulted in a 20% theoretical reduction in the amount of IVIG dispensed in a 12-month period.

Figure 2. Dexmedetomidine use.
Gross Antimicrobial Expenditures

- Cost Avoidance
- Actual Expenditures

The chart shows the increase in costs from FY00 to FY09, with a notable drop in FY06. The BWH Program Launch is indicated within the chart.
Committee Participation

- ACPE Committee
- Acute Care Documentation Committee
- Adverse Drug Event Committee
- Aerosolized Medication Task Force
- Alcohol Withdrawal Syndrome Task Force
- Antimicrobial Subcommittee
- Alaris/Smart Pump Medication Library Team
- ASHP Pharmacy Informatics and Technology Section Advisory Group
- ASHP Section of Clinical Specialists and Scientists: Programming Committee
- Chronic Pain Committee
- Combined Pharmacy Information System Steering
- Contrast Agent Safety Committee
- Council of Boston Teaching Hospitals Grand Rounds Steering Committee
- Critical Care Forum Advisory Board
- Deep Sedation Committee
- Delirium Task Force
- Diabetes Subcommittee
- Disaster Committee
- Drug Administration Guideline (DAG) Committee
- Drug-Drug Interaction Steering Committee
- Drug Safety Committee
- eMAR Business Owner Committee
- Emergency Department Care of Mechanical Ventilation
- Emergency Response Committee
- Event Engine Committee
- Executive Walk-rounds Group
- Falls Prevention Committee
- Forms Subcommittee (of the Medical Records Committee)
- GCRC Implementation Meetings
Daily Departmental Clinical Meeting

- Monday – Friday

- Clinical pearl – short topic discussion – operational pearl – safety M&M – hospital initiatives – feedback on guidelines etc

- 3:20 – 3:30 departmental updates and shift pass-off

- All staff are encouraged to participate and present

- Participation is documented on annual review

- Tuesday is Journal Watch Day!
Tuesday 3PM Meeting: The Journal Watch

- Over 25 peer reviewed journals reviewed
- Weekly meeting with 4 to 5 presenters each week
- Each journal presented every 5 weeks
- Contents are summarized for clinically significant
  - Trials
  - Reviews
  - Editorials
  - Case Reports
BWH Pharmacy  ADE Clinical Surveillance System

- Real-time alert monitoring application
  - Over 100 rules-based alerts (pharmacy, lab, micro)
  - Interventions documentation system
  - Patient Flags: electronic shift communication tool
  - Antimicrobial stewardship (drug-bug mismatch)

- Robust patient specific information and built-in clinical resources enhancing patient care and departmental communication
- FY13 ADE Monitor total interventions: 2,416
- FY14 YTD Interventions: **15,005**
Top Interventions by Alert: 5 Months

- Glucose: High, blood; 963
- Vancomycin level; 736
- IV to PO switch; 683
- Digoxin and rising/elevated Scr; 101
- Rising Scr and on Vancomycin; 137
- LMWH, no periodic Hgb/Hct; 149
- High aPTT and on Heparin; 169
- Potassium orders and elevated Scr; 171
- Warfarin and Heparin/LMWH/fondaparinux and INR over 2; 172
- Active Anticoag and low Hgb (&lt;7g/dL); 212
- Enoxaparin and Scr &gt; 1.5; 253
- Heparin infusion subtherapeutic; 261
- TAM II susceptibility known, inpatient; 266
- Filgrastim (GCSF) / WBC; 274
- Potassium: Critical, serum; 302
- Heparins and platelet decrease; 383
Training/Board Certification

- BCPS
- BPS – Critical Care

PRN Opinion Paper

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Conclusions

- ICU pharmacist can make impact
  - Clinical
  - Financial

- Clinical practice differs globally; however the evolution of pharmacy practice is an on-going progression

- Training and certification are important, but not the end all
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