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Clinical Pearls from CE Presentations at ASHP Midyear Clinical Meeting 2015

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Publishing in Peer-Reviewed Journals

Manuscript Tips

- Be specific
- Order of writing
  - Methods → Results → Intro → Discussion
- Journal choice
- Peer review comments

Worrying About Tomorrow, Today: Expanding Pharmacists' Knowledge of Laboratory Tests in Infectious Diseases

Serology: NLCR, ESR

- **Neutrophil-lymphocyte count ratio (NLCR)** shown to be a predictor of infection severity
  - Ratio of neutrophils to lymphocytes
    - As neutrophils increase vs. lymphocytes → larger value
    - Larger value → greater predictor of bacteremia in ED
  - Patient mortality can be characterized by NLCR value

- **Erythrocyte sedimentation rate (ESR)**
  - rises within 24-48 hours of infection and/or inflammation
    - ESR_{men}: age divided by 2
    - ESR_{women}: (age + 10) divided by 2
  - can be affected by etiologies which affect RBC or fibrinogen normal values

Serology: CRP

- **C-reactive protein (CRP)**
  - Normal range: 0.3-2 mg/L
  - Can be affected by
    - CRP gene polymorphism
    - Smoking
    - Cardiac ischemia
    - Inflammatory conditions
  - Marker for infection values range: >7.8 mg/L to <150 mg/L
  - Predictor of bacterial load
    - Ratio of <0.8 at 4 days when compared to baseline →
    - Appropriate antibiotic therapy

Serology: PCT

- **Procalcitonin (PCT)**
  - Increases within 2-4 hours of infection and peaks after 6-24 hours
  - Tool for determining need and duration of empiric antibiotic therapy
    - Decrease ICU days and overall LOS
    - Neutral effect on resistance rate and infection recurrence
  - Mortality risk association
    - Death in non-ICU patients using PCT >0.12 µg/L

Blood Cultures

GOLD STANDARD

- False positives: 30-50%
- False negatives if antibiotics have been initiated in ED

Lab Test Advantages & Disadvantages

Test	Advantages	Disadvantages
WBC	• fast and cheap	• non-specific • highly influenced by other causes (e.g. steroids)
NLCR	• fast and cheap • **predictor of infection severity and outcomes**	• potential for confounding factors (e.g. chemo)
ESR	• fast and cheap • highly specific	• potential for confounding factors (e.g. inflammatory conditions) • low sensitivity
CRP	• fast and cheap • predict patient's response to antibiotics	• non-specific • 96 hour response assessment time
PCT	• not affected by autoimmune disease and/or steroid use • highly specific; **correlates with severity**	• prone to dysregulation

"Top of Your License" Code Response: Elevating the Pharmacist Role

Updates in ACLS Pharmacotherapy

Out-of-Hospital Cardiac Arrest

- Out of hospital cardiac arrest (n=851) randomized to IV ACLS drugs vs. no ACLS drugs
- Primary outcome: survival to hospital discharge
- Results (ACLS drugs vs. no ACLS drugs)
  - ROSC (40% vs. 25%; p<0.001)
  - Admitted with ROSC (32% vs. 21%; p<0.001)
  - **Survival to hospital discharge** (10.5% vs. 9.2%; **p=0.61**)
  - Favorable neurological outcomes (9.8% vs. 8.1%; p=0.45)

Olasveengen et al. *JAMA.* 2009;302(20):2222-2229

Systematic Review & Meta-Analysis

Survival to Discharge

Cardiac Arrest:

Inverse relationship between use of epinephrine, atropine, sodium bicarbonate and survival to hospital discharge

Patanwala AE, et al. Minerva Anestesiol 2014; 80: 831-43.

- Outcomes: survival to hospital discharge, neurologically intact survival
- Sample size = 435,089 (9 articles out of 2,071)
- RCT show odd ratio (OR) not significant for EPI use
- Observational (high quality) show OR favoring no EPI for both outcomes

At a Code

- Vasopressin – steroids – epi scheme vs. epi – 0.9% saline (n=130 vs. n=138)
  - Mentzelopoulous SD, et al. *JAMA.* 2013;310:270-279
  - Primary outcomes: ROSC ≥ 20 minutes, survival to hospital discharge
  - Results
    - ROSC (p=0.005)
    - Survival to hospital discharge (p=0.02)

- Code-related errors (dosing, aseptic technique, etc.)
- Dosing card
- Infusion pumps
- Pharmacist knowledge

Code Response! More than Meds to Prevent a Total Eclipse of the Heart

Pre-Code Preparation

- Maintain up to date certifications
  - BLS, ACLS ± PALS
- Be familiar with crash cart contents
  - Adult and Pediatric
- Utilize high fidelity patient stimulation
- Attend as many codes as possible

Intra-Code Opportunities

- Pharmacist Assessment
  - Anticipate needs
  - H's and T's
  - Medication List
  - Allergies
  - Family and friends present

- Communication
  - Announce and introduce yourself
  - Speak up if you have ideas
  - Closed loop communication

Intra-Code Opportunities

- Documentation
  - Opportune position to record
  - Minimize use of valuable time “backtracking”
  - Fill in holes post-code

- Be involved
  - Chest compressions
  - Prepare defibrillator
  - Locate non-drug items
  - Analyze rhythms

Training and Engaging Pharmacy Learners

- Engage students and residents in code situations
- Resources
  - Pocket Cards
  - ASHP Emergency Care Resource Center
- Discuss opportunities for improvement and involvement

Drugs Leaking Out of a Vein: What a Pain!

Background

- Infiltration: a nonvesicant in surrounding tissue
- Extravasation: a vesicant in surrounding tissue
- Signs/Symptoms
  - Pain/burning/discomfort
  - Skin color changes
  - Numbness/tingling/paresthesia
  - Coolness/warmth around site

Management

1. Cease administration
2. Aspirate fluid with syringe
3. Discontinue vascular access
4. Cleanse site and affected areas
5. Pharm/non-pharm treatments
6. Patient & caregiver education
7. Documentation
8. Monitoring
9. Event reporting

Management

- Refer to literature and policies
  - Hyaluronidase
  - Phentolamine
  - Terbutaline
  - Nitroglycerin

- Documentation
  - Date/time
  - Agent implicated
  - Signs/Symptoms
  - Vascular access specifications
  - Interventions
  - Monitoring and education provided

After…

- Collect trends within institution
- Evaluate newly published case reports
- Consider pre-built order sets

The Continued Search for the Magic Bullet: This is Not Your Parent's Marijuana

Potential Benefits

- Appetite stimulation
- Antiemetic
- Antispasmodics
- Analgesic
- Lowering of intraocular pressure
- Anticonvulsant
- Neuroprotective and antioxidant
- No “lethal” dose
- Enhance analgesic activity of co-administered opiates

Medical Marijuana in Chronic Pain Patients

- Currently not legal

- Issues we may need to consider
  - How to ensure proper use, selection, “dose”
  - Challenges of acquisition
  - Legal challenges
    - State laws vs federal laws
  - Patient education
  - Drug interactions
  - Adverse effects

Updates in Pulmonary Medicine: A 'Hands On' Approach with Novel Inhalers

Inhaler Selection

- Patient Factors
  - Age
  - Physical and cognitive ability
  - Delivery system
  - Hand-lung coordination
  - Patient education
- COST
- Dose Counter

Financial Access

- Discount Drug Programs
  - Good Rx
  - LowestMeds
  - Others

- Marissa

Counseling

- Controller vs rescue
- Assembly
- Documenting expiration date
- Priming and repriming
- Activation
- Storage

- Visual signals
  - Red/green indicators
  - Dose counters

New Preceptors on the Block: Hanging Tough with Resident and Student Integration and Feedback

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Learner Types: Pharmacists' Inventory of Learning Styles (PILS)

- Accommodator – deals directly with people, little patience, hands-on, leads because feels they are best-suited, confident, strong opinions
- Assimilator – works alone or with small groups, avoids being center of attention, observer, can be own worst critic
- Converger – Focused, leader, decisive, but may not be perfect due to speed, likes a challenging environment
- Diverger – free-spirited, entertainer, motivator, concerned about perception of others, focuses mainly on theoretical issues

New Preceptors on the Block: Hanging Tough with Resident and Student Integration and Feedback

Resident Types:

- Over-Confident – Accomodator/Converger
  - Needs direct, succinct, and global feedback

- Negative Nelly – Diverger
  - Needs frequent positive feedback, confidence boosters, "sandwich" method

- Over-Achiever – Assimilator
  - Praise for what's done, facilitate decision making, work-life balance, focus

- Unmotivated – Converger/Accommodator
  - Needs clear direction and expectations, relate lessons to real life

Insights into IV Medication Safety: A Matter of Perspective from the Frontline Pharmacist and Nurse

Insights into IV Medication Safety: A Matter of Perspective from the Frontline Pharmacist and Nurse

Lines, Tubes, and Devices

- Affix labels or other color-coded tabs to lines
- Trace lines back to source
- Flushing lines, types of tubing, filters

Pain Management

- Monitoring for Over-sedation
  - End-tidal CO_2 for PCA, Pulse Ox for sedation
- Inpatient Hospice
  - Recognize starting/appropriate doses, pain vs opioid toxicity
- Elastomeric Devices
  - Pharmacy Involvement
  - Education

Insights into IV Medication Safety: A Matter of Perspective from the Frontline Pharmacist and Nurse

Heparin

- Multiple concentrations and indications
- Multiple catheter types/devices (ECMO, CRRT, etc)
- Therapeutic vs prophylactic dosing
- Pump Screen Layout
- Programming – dose or rate priority

Investigational Drugs

- Storage – Freezers
- Compounding
  - Isolate
  - No horizontal laminar flow hoods
  - Quick transport
  - Protocols for infusion time and volume

Insights into IV Medication Safety: A Matter of Perspective from the Frontline Pharmacist and Nurse

Patient's Own Infusions and Devices

- Different cassettes/tubing, routes of administration
- Product integrity and liability
- Patient Consent form
- Preparation Considerations
  - Staff competency
- Administration Considerations
  - Nursing knowledge
- Operational Considerations
  - Maintenance and infection control

Evidence-Based Approach to Insulin Use in Type 2 Diabetes

Evidence-Based Approach to Insulin Use in Type 2 Diabetes

When to Consider Insulin Initiation in Type 2 Diabetes (T2DM)

- Guideline Differences

ADA	AACE/ACE
• At diagnosis with overt symptoms and/or severe hyperglycemia (A1c ≥ 9%) with or without additional medications	• A1c ≥ 7.5% as dual therapy option • A1c > 9% and symptomatic with or without additional medications

Evidence-Based Approach to Insulin Use in Type 2 Diabetes

Prandial Insulin

- ADA: Prandial glucose not controlled after target FBG reached or doses > 0.5 U/kg/day (consider GLP-1 trial)
  - Add 1 dose prandial insulin at largest meal
  - 4 units, 0.1 U/kg or 10% basal dose
  - Titrate to 2 or 3 doses/day, increase dose by 1-2 units or 10-15%

- AACE/ACE: 50% Total Daily Dose Prandial Insulin
  - Pre-meal BG > 180mg/dL – increase TDD by 10%

Evidence-Based Approach to Insulin Use in Type 2 Diabetes

Novel Basal Insulins

- Glargine U-300 (Toujeo®) – convert unit per unit with basal insulin
  - NPH – 80% of Total daily dose
  - May reduce risk of hypoglycemia

- Degludec (Tresiba®) – Ultra-long acting insulin (10 units daily)
  - May reduce risk of nocturnal hypoglycemia compared with Lantus ®

Evidence-Based Approach to Insulin Use in Type 2 Diabetes

Novel Prandial/Pre-Mixed Insulin

Lispro U-200 (Humalog KwikPen®)

- Bioequivalent to U-100 in 1:1 conversion (1/2 volume)

Inhaled Insulin (Afrezza®) – recombinant regular human insulin

- Start at 4 units per meal and titrate by 4 units every 7 days
- Units of 4
- Inhaler good for 15 days
- Black Box Warning – Acute Bronchospasms with COPD

Evidence-Based Approach to Insulin Use in Type 2 Diabetes

- Novel Pre-mixed Insulin
- Ryzodeg (Degludec/Aspart)
    - Daily or BID **with** any meal with prandial insulin if needed
- Transitioning to Pre-Mixed Insulin
    - 2/3 AM, 1/3 PM **OR** ½ AM, ½ PM
    - Ryzodeg 1:1 conversion
        - Basal + Bolus – continue prandial insulin for meals not covered

Antimicrobial Stewardship In the ED: Challenges and Opportunities

Antimicrobial Stewardship In the ED: Challenges and Opportunities

Inability to perform “Traditional” Stewardship

- De-escalation, IV/PO, Duration, Cost reduction, etc.

Barriers to Overcome

- Leadership buy in, resources, access, incorporation into process reviews, changing existing processes and mindsets

Antimicrobial Stewardship In the ED: Challenges and Opportunities

Stewardship Strategies in the ED

- EM Pharmacist
  - Facilitates selection/dose, point person, monitor all ED patients, identify any medication errors

- Individualized ED Specific Guidelines
  - Resistance patterns and formulary status of antimicrobials
  - Uniform treatment

- Clinical Decision Support
  - Order set usage based on patient-specific factors
  - Alerts and reminders
  - Clinical guidelines

Antimicrobial Stewardship In the ED: Challenges and Opportunities

Stewardship Strategies in the ED

- Rapid Diagnostic Tests (results within 4 hours)
  - Strep antigen, respiratory virus panel, procalcitonin, C. diff antigen, organism ID (MRSA/MSSA PCR)

- Decentralized ED Pharmacist: Sepsis!
  - Rapid antibiotics initiation, optimization

- Culture Surveillance and F/U – already in place here

- Education Opportunities – D/C Rx review for routine cultures, blood cultures

From Cough to Ketamine: Management of Pediatric Status Asthmaticus

From Cough to Ketamine:
Management of Pediatric Status Asthmaticus

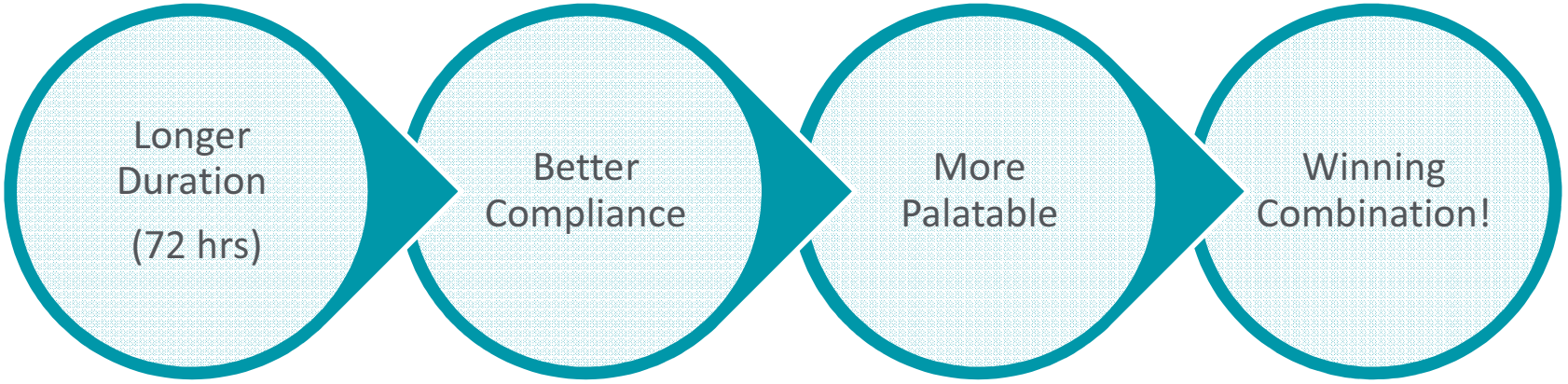
Objectives

- Reviewed pediatric dosing of albuterol and ipratropium as well as when intermediate vs continuous administration is indicated
- Corticosteroid recommendations in pediatrics
- Nurse vs Physician administration of corticosteroid therapy
  - Primary Outcome: time to administration

From Cough to Ketamine:
Management of Pediatric Status Asthmaticus

Corticosteroids

- NHLBI Guidelines
  - prednisone, prednisolone, or methylprednisolone
- What about dexamethasone?



From Cough to Ketamine:
Management of Pediatric Status Asthmaticus

1 dose Dex vs 5 days Pred	2 dose Dex vs 5 days Pred
Randomized, mild-mod exacerbations	Randomized, mild-mod exacerbations
Dex: 0.6 mg/kg/dose (max 18 mg) Pred: 1 mg/kg/dose (max 30 mg BID)	Dex: 0.6 mg/kg/dose (max 16 mg) Pred: 2 mg/kg/dose (max 60 mg), followed by 1 mg/kg/day (max 60mg)
Return to Baseline: 5.21 vs 5.22 days	Relapse rate: 20 vs 18 (p=0.84)
Symptoms at day 5: 16 vs 13 pts	Admission post relapse: 4 vs 3 (p=0.81)
	Noncompliant with discharge dose: 1 vs 10 (p=0.004)
	Vomiting at home: 6 vs 11 (p=0.17)

Treating the Flu is SNOT that Easy: An Update on Influenza Antiviral Therapy

Treating the Flu is SNOT that Easy:
An Update on Influenza Antiviral Therapy

Objectives

- Describe the pharmacokinetics and pharmacodynamics of oseltamivir
- Evaluate current recommendations for high vs standard dose oseltamivir and identify which patient population could benefit from high-dose oseltamivir
- Apply the new FDA-approved dosing recommendations for oseltamivir to a patient with renal impairment

Treating the Flu is SNOT that Easy:
An Update on Influenza Antiviral Therapy

Neuraminidase Inhibitors

- Oseltamivir (Tamiflu) 75 mg PO BID x 5 days
- Zanamivir (Relenza Diskhaler) 2 INH (10 mg) daily x 10 days
- Peramivir (Rapivab) 600 mg IV x 1 dose

FDA-approved indication

- Treatment of Influenza A and B in children ≥ 2 weeks, adults with symptoms for ≤ 2 days
- Prophylaxis against Influenza A or B infection in children ≥ 1 year and adults

Critically ill recommendations

- Double the dose → 150 mg BID (or renal equivalent)
- Longer treatment duration → Ex. 10 days

Treating the Flu is SNOT that Easy:
An Update on Influenza Antiviral Therapy

Larger Dose

- Expert consensus due to H1N1 pandemic
- Severe influenza → higher viral replication → higher viral load
- Higher dose may be warranted

Treatment Duration

- Study in mice with H5N1
- Received 10 mg/kg/day BID x 5-8 days
- Residual virus detected in 5 day treatment group
- Improved survival in 8 day group
- Patient trials have not shown any significance

Treating the Flu is SNOT that Easy:
An Update on Influenza Antiviral Therapy

CrCl (ml/min)	Standard Dose
> 30	75 mg BID
10 - 30	75 mg daily
Hemodialysis	30 mg every other HD session
CRRT	No recommendations

CrCl (ml/min)	Non-critically Ill Pts	Critically Ill Patients
> 30	75 mg BID	150 mg BID
< 30	75 mg daily	75 mg BID
CRRT	75 mg BID	150 mg BID
Hemodialysis	30 mg after every other HD session	30 mg daily

Making Sense of Infectious Diseases Clinical Practice Guidelines

Making Sense of Infectious Diseases Clinical Practice Guidelines

Single Center Cohort of Canadian HCAP Patients

N=3295	Adherent	Non-adherent
CAP	86/1557 (6%)*	109/1097 (10%)*
HCAP	6/35 (17%)	18/148 (12%)

*P = < 0.05, primary outcome = 30 day all-cause mortality

Multicenter Cohort of VA Patients with Non-ICU HCAP

	Overall	GC-HCAP	GC-CAP	Non-GC
Number	15071	1211	11408	2452
30 day Mt	12.6%	22.8%	9.9%	20.1%

*HCAP guideline use associated with Mt aOR 2.18 (1.86 – 2.55)

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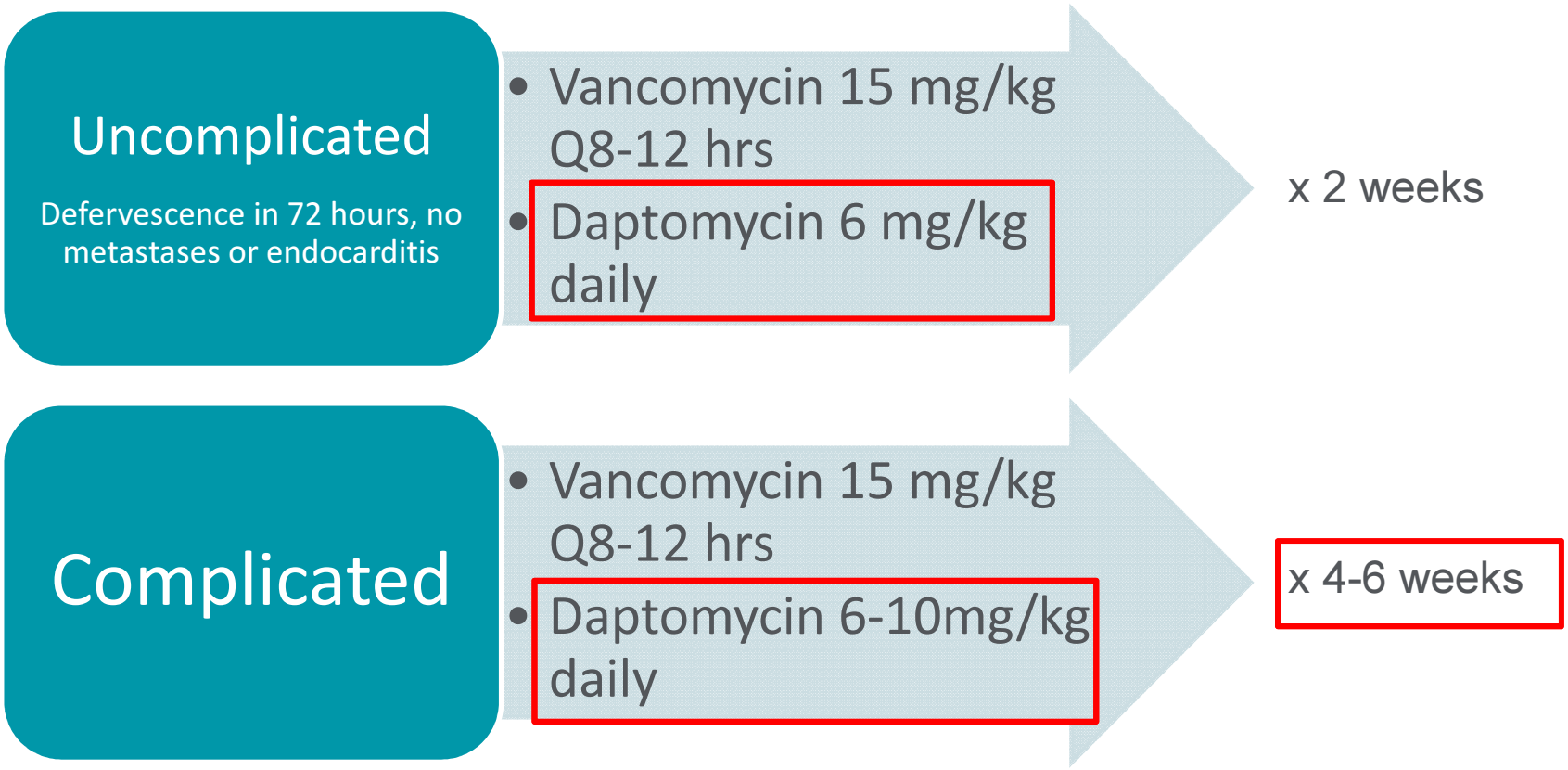
/ Grenier C et al. *J Antimicrob Chemother* 2011;66:1617-24
Attridge RT et al. *Bur Respir J* 2011;38:878-87

Making Sense of Infectious Diseases Clinical Practice Guidelines

MRSA Bloodstream Infections



Antimicrobial Stewardship: More Important than Ever

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Key Takeaways

- Pharmacy organizations can play a key role in collaboration with organizations, but must actively seek opportunities for involvement.
- Measuring the effectiveness of local ASP strategies is crucial
- Leveraging new technologies can be used to support pharmacists performing front line stewardship activities

Antimicrobial Stewardship: More Important than Ever

- Training all pharmacists in antimicrobial stewardship
  - Pharmacokinetics service
- Active engagement between all members of the ASP team
  - Microbiology Lab
  - Infectious Diseases Physician
- Administrative support for new technologies to expand this service
  - Rapid Diagnostics
  - Protocol/Guideline Interventions

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Questions?

1/12/2016