



Bones, Stones or Lying Prone in the Emergency Department: Not just Glass Beads but Precious Pearls



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Conflict of Interest

- I have no potential or actual conflicts of interest to declare



Objectives

- To identify where clinical pearls may be useful to your practice
- To list the reasons why it is important for pharmacists to conduct admission medication histories
- To understand how medications may be delivered intraosseously
- To gain an approach for advanced cardiac life support



What is a Clinical Pearl?

- An anecdotal method of relaying information
 - An absolute, that can be generalized to other patients
- Contrasts with EBM that relies on literature
- Applying evidence to your patient still requires professional judgment
 - Thus may assist in application of EBM
- Relays information not widely known
 - A "pearl" and not just a "glass bead"

Mangrulkar et al. Am J of Med 2002;113:617-24.



What is a Clinical Pearl?

“Treat the patient not the lab value”



Denise Sprague

What is a Clinical Pearl?

“Start low and go slow”

James McCormack



What is a Clinical Pearl?

“A list of side effects is not a monitoring plan”

“Take care of patients, don’t follow them”

Richard Slavik

What is a Clinical Pearl?

Table 3. Strengths and Weaknesses of Pearls and Evidence-Based Medicine

	Clinical Pearls	Evidence-Based Medicine
Strengths	<ul style="list-style-type: none"> • Patient specificity • Easy retention of information • Patient-specific “hooks” • Well-respected teacher delivers • Emphasis on transmitting information 	<ul style="list-style-type: none"> • Systematic, relatively unbiased approach to important clinical questions • Scientifically rigorous • Provides numbers to accurately reflect reality
Weaknesses	<ul style="list-style-type: none"> • Ending • Lack of scientific rigor • Biased by experience, often anecdotal • Delivered in absolute terms, not usually reflecting reality 	<ul style="list-style-type: none"> • Little emphasis placed on individual patient • Difficult to retain information • No emphasis on improving the transmission of information • Offers no help with decision uncertainty • Often boring and tedious

Mangrulkar et al. Am J of Med 2002;113:617-24.

SCENARIO

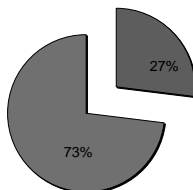
Scenario 1

- You are precepting a student/resident
- While reviewing a patient you find that the student’s medication history came from PNET only
- You:
 - A: Scream in frustration
 - B: Rip up the PNET and tell the student to start over
 - C: Remember a pearl that Dawn told you during this talk that you could pass on

Medication Histories

Prescribing Errors

■ Incomplete Histories
■ Other



•Errors of:


- Omission
- Commission
- Intentional
- Unintentional

Tam et al. CMAJ 2005;173(5) . Available: <http://www.cma.ca/cgi/content/full/173/5/510> [accessed Oct. 17, 2008]

Medication Histories


- Pharmacist conducted medication histories decrease mortality
- Pharmacists do a better job
 - 78% of histories taken by MD or RN were incomplete compared to a pharmacist
 - 4.4 DRPs per patient identified with a pharmacist history vs. 2.2 DRPs with no history

Bond et al. Pharmacotherapy 2007;27(4):481-93.
Carter et al. Am J Health Syst Pharm 2006;63(24):2500-3.
Viktil et al. Pharmacoepidemiol Drug Saf 2006;15(9):667-74.




Medication Histories

- Why?
 - They are the best source of information
 - May uncover non-compliance or adverse drug event could have led to this visit
- Who needs a medication history?
 - Admitted patients
 - "Sick patients"
 - Going to LTC or require a blister pack
 - Many medications
 - Cognitive impairment
 - High-risk populations
 - Narrow therapeutic range medications




Medication Histories

- Best sources of information
 - Patient/family
 - PNET
 - Community pharmacy
 - Family physician or specialist
 - Health care worker
- Be organized
- Bring a copy of PNET
- Go through their medications if available
 - Organize them according to indication
- Wake them up or set a time to come back




Medication Histories

- Introduce yourself
- Open and closed ended questions
 - Allergies
 - Social (smoking, etoh, illicit drugs)
 - Vaccine history
 - Prescription medications
 - OTC herbals
 - Compliance
 - Community pharmacy
- Drug and disease matching
- Keep on task but be flexible



Medication Histories

- Document
 - Where did you get the information
 - Compliance
 - Missing information
 - Patient's own medications
 - What follow-up may be required
- Give them a medication card
- Do they have any questions for you?



Interior Health

PATIENT INFORMATION

What you can do to ensure your own medication safety

Medications can greatly improve your quality of life. However, if taken the wrong way, they can put your health at risk. The following are tips on how to prevent medication errors, and improve your health care.

1. **Use a Personal Medication Card:**
 - Interior Health provides medication cards free of charge. To print cards from home go to <http://www.interiorhealth.ca>
 - Keep the card with you at all times; it will conveniently fit in your wallet.


What is included on this card?

Medication List:

- It is important to fill out the medication list provided on these cards with:
 - The name of each medication
 - The strength of each medication
 - The dose you take and when you take each medication
 - The purpose of each medication
- Include on your medication list any prescription medications, nutritional supplements, vitamins, herbal remedies, over-the-counter or non-prescription drugs, and any samples provided to you by your physician.
- Anytime your medications change, update your medication list (or have your healthcare provider update it for you).
- Review your wallet card with your health care providers at every visit. One provider may not know about medications that others have prescribed for you.

Personal Information:

<http://www.interiorhealth.ca/choose-health.aspx?id=228>



Scenario 2

- You are on-call, it is 2 am and the cell phone rings
- It is a frantic emergency nurse on the other end of the phone
- She cannot find information on giving cefazolin intraosseously in the IV manual
- You:
 - A: Freak out and wish you had slept through the call
 - B: Say you have no idea, try ceftriaxone IM instead
 - C: Spend 20 min. trying to find the answer, while you wish you were still sleeping
 - D: You remember a pearl that Dawn told you during this talk

Intraosseous Infusions

- First suggested in 1922
- Used extensively in 1930 & 40's (WW II)
- Increase in children in 1980's
- Now in neonates, pediatrics and adults
- Access site
 - Sternum (adults), proximal humerus, proximal tibia, iliac crest, tibial malleolus
- In conscious patients use local anesthesia

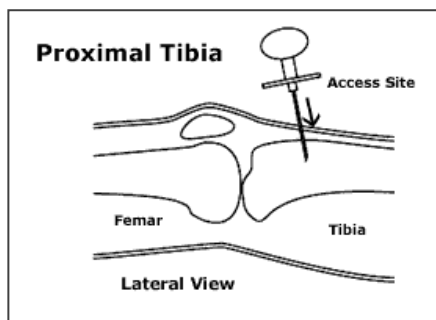
Buck et al. Ann Pharmacother 2007;41:1679-86.

Intraosseous Infusions



http://www.chinookmed.com/assets/images/products/05300mdns_web.jpg

Intraosseous Infusions



http://www.rch.org.au/nets/handbook/media/intraosseousNeedleInsertion_1.gif

Intraosseous Infusions

- Takes 1-2 min with 72-87% success rate
- Only one attempt per bone
- Physiology
 - Cannulation of medullary cavity
 - Enter venous sinusoids
 - Drain to central venous channel
 - Leave through nutrient or emissary veins to systemic circulation

Buck et al. Ann Pharmacother 2007;41:1679-86.

Intraosseous Infusions

- Indications
 - Unstable or arrested patient without IV access
 - Children after 2 attempts at IV or 2 min. (PALS)
 - IO before ET drugs in adults (ACLS)
- Contraindications
 - Fracture (absolute)
 - Previous orthopedic procedure
 - Infection or burns to area
 - Inability to find landmarks
 - Inferior vena cava injury

Buck et al. Ann Pharmacother 2007;41:1679-86

Intraosseous Infusions

- Complications
 - Extravasation (12%) and osteonecrosis
 - Infection/osteomyelitis (0.6%)
 - Fracture (few case reports)
 - Compartment syndrome (one case report)
 - Embolism (animal reports)
 - Needle fracture

Buck et al. Ann Pharmacother 2007;41:1679-86

Intraosseous Infusions

- What can be given IO?
 - Everything (ACLS medications, isotonic fluids, blood products)
 - Standard IV doses used
- Push medications require a 5-10 mL flush of saline
- Infusions require a pump
- Can use up to 24 hours

Buck et al. Ann Pharmacother 2007;41:1679-86

Table 1. Drugs Used in Intraosseous Administration ^{a,11,13,19,24}		leoprololol	laboratory ²⁰
Drug	Supporting Evidence ^b	Isradin	clinical ¹⁰
Adenosine	clinical ¹²	Lidocaine	clinical ^{10,12,18} laboratory ²⁴
Amikacin	laboratory ²¹	Mannitol	clinical ^{10,24}
Aminophylline	clinical ¹⁸	Midazolam	clinical ¹⁸
Amiodarone	clinical ¹⁸	Morphine	clinical ^{10,24}
Ampicillin	laboratory ²⁵	Naloxone	clinical ¹⁸
Atropine	clinical ^{6,13,19,20} laboratory ¹⁷	Nonparaldehyde	clinical ¹⁸
Calcium chloride	clinical ^{6,13,19,20} laboratory ²⁴	Phenobarbital	laboratory ²²
Calcium gluconate	clinical ¹²	Phenytoin ^c	clinical ^{13,23} laboratory ²⁰
Cefotaxime	laboratory ^{25,26}	Propofol	laboratory ²³
Cefuroxime ^d	laboratory ²⁵	Rocuronium	clinical ¹⁸
Chloramphenicol ^b	laboratory ²⁶	Sodium bicarbonate	clinical ^{6,12,13,19,20} laboratory ²⁴
Dexamethasone	clinical ¹³	Succinylcholine	clinical ^{13,19,23,24}
Dextrose	clinical ^{6,13} laboratory ²⁴	Thiamine	clinical ¹⁸
Diazepam	clinical ¹³ laboratory ²⁰	Thiopental	clinical ¹⁸
Dobutamine	clinical ²⁰ laboratory ²³	Tobramycin ^c	laboratory ²⁵
Dopamine	clinical ^{13,19,20}	Vancocycin ^c	laboratory ^{25,21}
Epinephrine	clinical ^{6,13,19,20} laboratory ^{12,24,22}	Vasopressin	clinical ¹⁸ laboratory ^{20,22}
Ethomidate	clinical ¹⁸	Vecuronium	clinical ¹⁸
Fortanyl	clinical ¹⁸		
Furosemide	clinical ¹⁸		
Gentamicin	laboratory ²⁵		

^aClinical = results based on clinical studies or case series; laboratory = assessed in animal models.
^bAdministration via the intraosseous route may result in lower serum concentrations than those observed with intravenous dosing.

Buck et al. Ann Pharmacother 2007;41:1679-86

Intraosseous Infusions

- Bottom Line
 - Fast and Easy
 - Adults and Children
 - Low complication rate
 - All IV drugs and fluids for up to 24 hours
 - Limit hypertonic medications if possible

SCENARIO

Scenario 3

- You are asked to review the medications in the crash cart tray to see if they meet ACLS requirements
- You:
 - A: Your eyes glaze over and you get a headache
 - B: Run the other direction screaming I never learned this in school
 - C: Spend 3 afternoons at work trying to figure out the answer
 - D: Remember a pearl that Dawn told you during this talk


ACLS

- Where should you start looking for information?
 - www.heartandstroke.bc.ca
 - www.ACLS.net
 - ACLS Heart and Stroke manual (2005)



ACLS

- Advanced Cardiac Life Support
- BLS important to success
- No medication increases survival to hospital discharge
- Medication should be anticipated and given right after a rhythm check




ACLS

People arrest for a reason

- Hypothermia
- Hypovolemia
- Hyper/hypokalemia
- Hypoxia
- H+ acidosis
- Hypoglycemia
- Toxins and Tablets
- Tamponade (cardiac)
- Tension Pneumothorax
- Thrombus (MI)
- Thrombus (PE)
- Trauma

Sims et al. BC ACLS Algorithms (2005). www.heartandstroke.bc.ca [accessed Oct 17, 2008]




ACLS

If they are dead they don't have a blood pressure

Ed Dillon

- Ask yourself two questions before you proceed:
 - Is the patient alive or dead?
 - Is the patient stable or unstable?




ACLS

Asystole/PEA

- P Problem Search
- E Epinephrine 1mg IV/IO Q3-5 min
 - Vasopressin 40 U IV/IO once instead of 1st or 2nd epinephrine
- A Atropine 1mg IV/IO Q3-5 min
 - Max. 3 mg

Sims et al. BC ACLS Algorithms (2005). www.heartandstroke.bc.ca [accessed Oct 17, 2008]
ACLS.net 2006. www.ACLS.net [accessed Oct 17, 2008]




ACLS

Bradycardia

- Stable vs. Unstable
- Pacing Always Ends Danger
- P Pacing (get ready)
- A Atropine 0.5mg IV/IO Q3-5 min
 - Max. 3mg
- E Epinephrine 2-10 mcg/min IV/IO
- D Dopamine 5-20 mcg/kg/min IV/IO

Sims et al. BC ACLS Algorithms (2005). www.heartandstroke.bc.ca [accessed Oct 17, 2008]
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ACLS

Vfib/Pulseless VT

- SCREAM
- S Shock 360J
- C CPR for 2 min
- R Rhythm check after cycle of CPR
- E Epinephrine 1mg IV/IO Q3-5 min
 - Vasopressin 40 U IV/IO once instead of 1st or 2nd epinephrine
- M Antiarrhythmic medications
 - ALM (any legitimate medication)
 - Amiodarone, Lidocaine, Magnesium

Sims et al. BC ACLS Algorithms (2005). www.heartandstroke.bc.ca [accessed Oct 17, 2008]
ACLS.net 2006. www.ACLS.net [accessed Oct 17, 2008]




ACLS


Tachycardia

- Stable vs. Unstable
 - If unstable sedate and shock
- Regular vs. Irregular
 - Irregular afib/flutter
- Wide vs. Narrow
 - Narrow
 - Vagal, Adenosine 6 mg, Metoprolol 5 mg, Diltiazem 15 mg
 - Wide
 - Amiodarone 150 mg over 10 min
 - Synchronized Cardioversion

Sims et al. BC ACLS Algorithms (2005). www.heartandstroke.bc.ca [accessed Oct 17, 2008]
ACLS.net 2006. www.ACLS.net [accessed Oct 17, 2008]




ACLS




Afib/Flutter

- Stable vs. Unstable
 - If unstable sedate and shock
- >48 hours or less than 48 hours
 - < 48 hours
 - Rate (metoprolol, diltiazem, digoxin)
 - Rhythm (synchronized cardioversion, amiodarone, propafenone, procainamide)
 - >48 hours
 - No cardioversion
 - Anticoagulation x 3 weeks
 - Rate control as above

Sims et al. BC ACLS Algorithms (2005). www.heartandstroke.bc.ca [accessed Oct 17, 2008]
 ACLS.net 2006. www.ACLS.net [accessed Oct 17, 2008]




ACLS



- Bottom Line
 - Alive or Dead
 - Stable or Unstable
 - BLS is most important
 - Remove the underlying cause

References



- Bond et al. Pharmacotherapy 2007;27(4):481-93.
- Tam et al. CMAJ 2005;173(5). Available: <http://www.cmaj.ca/cgi/content/full/173/5/510> [accessed October 17, 2008]
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