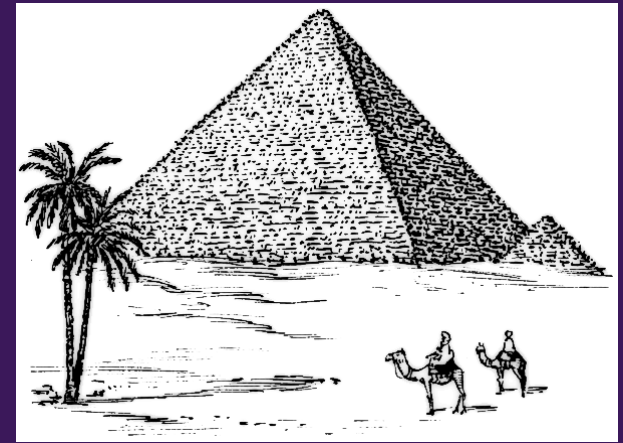




HEALTH SCIENCES LIBRARY

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University Libraries



Exploring the Evidence Pyramid

Janet G Schnall, MS, AHIP
University of Washington
Health Sciences Library
Seattle, WA 98195
schnall@uw.edu

Objectives

- Describe the levels of evidence in the Evidence Pyramid, a hierarchy of research evidence
- Identify web resources to use for nursing research and evidence-based practice to improve patient care
- Locate resources on HEALWA, the health evidence website for WA state nurses and other professional groups
- Identify a method of managing research with a citation manager

Exploring the Evidence Pyramid List of eResources

Exploring the Evidence Pyramid

Janet G. Schnall, MS, AHIP
Information Management Librarian
University of Washington Health Sciences Library
schnall@uw.edu

Key

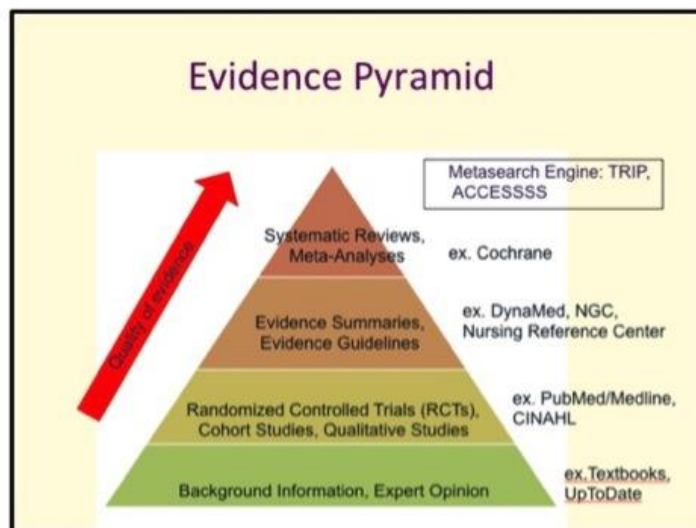
S=Fee required (or contact your local hospital or clinic library)

M=Mobile (includes mobile applications and interfaces optimized for mobile access)

O=Online

H=HEAL-WA (Online access to evidence-based health information resources for Washington State nurses and other health professionals; registration required) healwa.org/

- c. Each level of the pyramid draws on research evidence from the lower layers.
- d. Best to begin searching for evidence at the top of the pyramid.
 - i. More synthesized evidence is found at the higher levels
 - ii. However, fewer studies are available at the top of the pyramid.
- e. If you don't find the best level of evidence to answer the question, move down the pyramid to other types of studies.

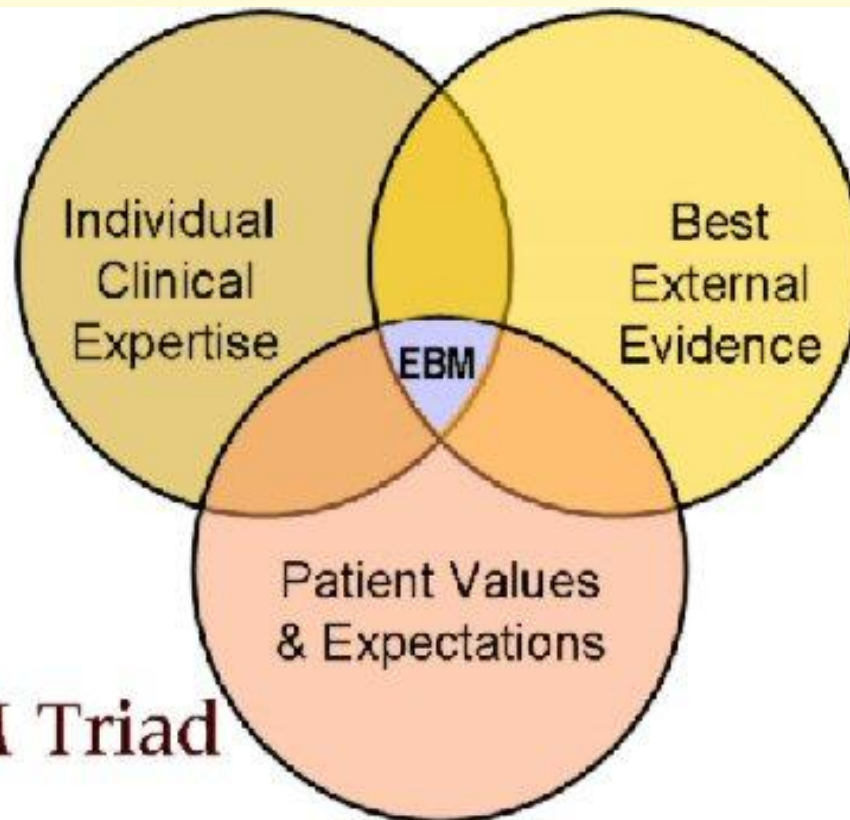


What is evidence-based practice?

- Evidence based medicine is the **conscientious, explicit, and judicious use of current best evidence in making decisions** about the care of individual patients.
- The practice of evidence based medicine means **integrating individual clinical expertise with the best available external clinical evidence** from systematic research.

Sackett DL et al. Evidence based medicine: what it is and what it isn't. *BMJ* 1996 Jan 13; 312 (7023): 71-2.

Evidence-Based Practice



The EBM Triad

Steps for EBN Practice

0. Cultivate a spirit of inquiry.
1. Convert your information into an answerable question (PICO)
2. Search the literature for the best available evidence
3. Critically appraise the evidence for validity and usefulness
4. Apply the findings to your clinical practice along with clinical expertise and patient's perspective to plan care
5. Evaluate the outcomes of your practice decisions or changes based on evidence
6. Disseminate EBP results

Melnyk BM, Fineout-Overholt E, Stillwell SB, Williamson KM. Evidence-based practice: step by step: the seven steps of evidence-based practice. *Am J Nurs* 2010 Jan;110(1):51-3

What makes good evidence?

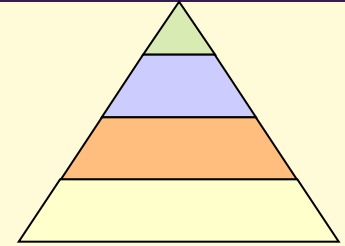
Good

- Based on scientific research
- RCT
- Systematic review
- Meta-analysis
- Clinical guidelines

Shoddy

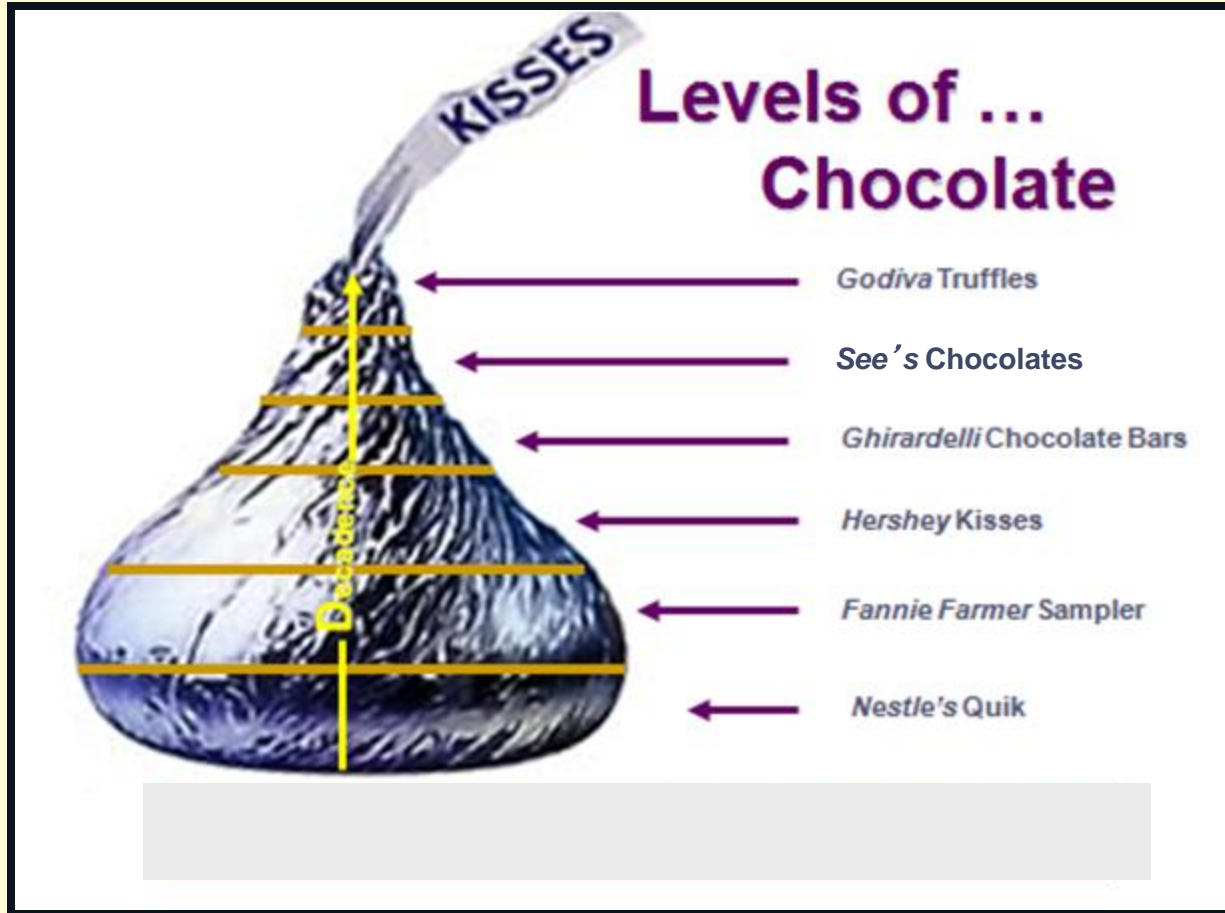
- Opinion
- Consensus
- Because it's been done this way for 100 years

What is an Evidence Pyramid?



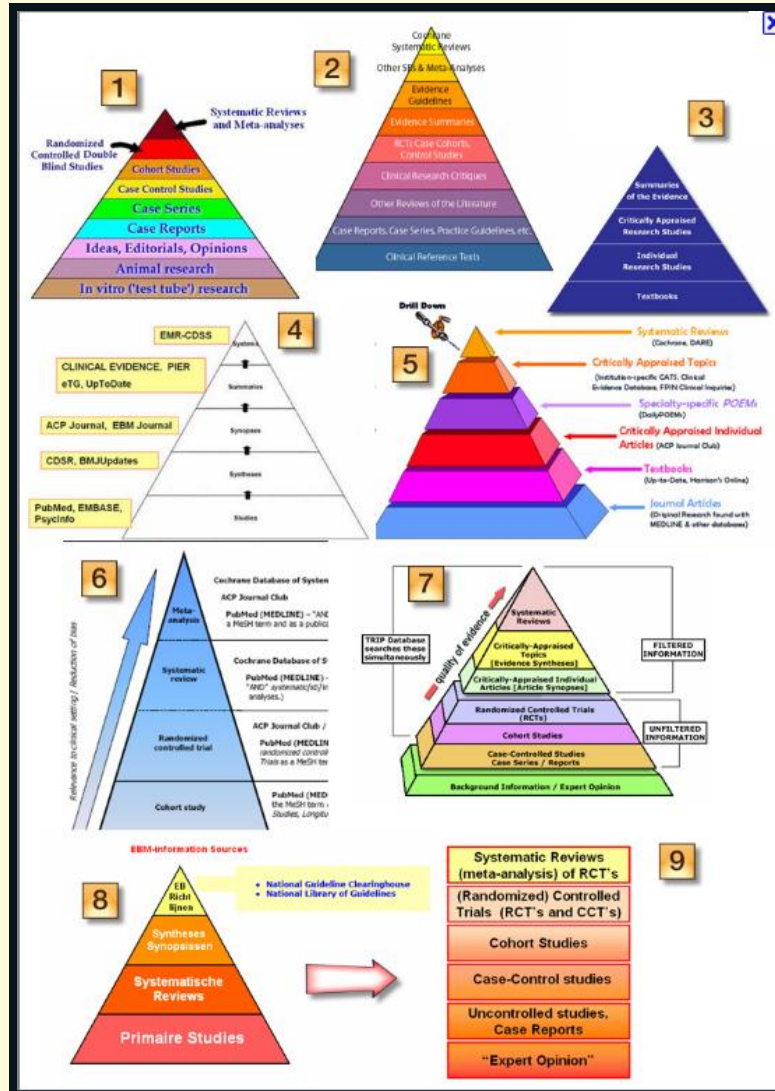
- Guideline to the **hierarchy of evidence** available.
- Guide for finding the best evidence quickly and efficiently.
- Each level of the **pyramid draws on research evidence from the lower layers.**
- **Best to begin searching for evidence at the top** of the pyramid.
 - More synthesized evidence is found at the higher levels.
 - Fewer studies are available at the top of the pyramid.
- If you don't find the best level of evidence to answer the question, **move down** the pyramid to other types of studies.

Chocolate Decadence Pyramid

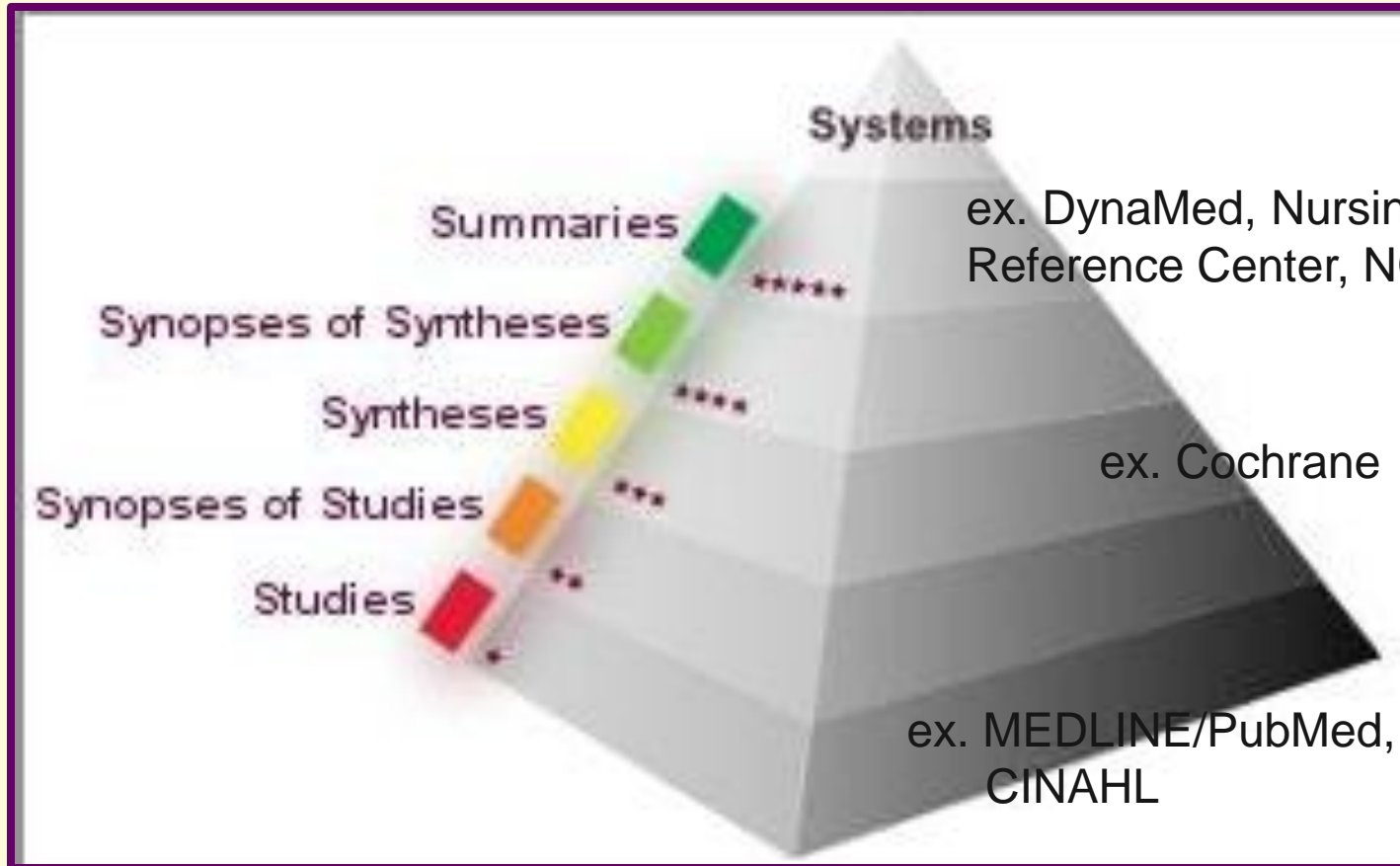


Slide adapted from Edward G. Miner Library, University of Rochester School of Medicine and Dentistry

Lots of Evidence Pyramids!

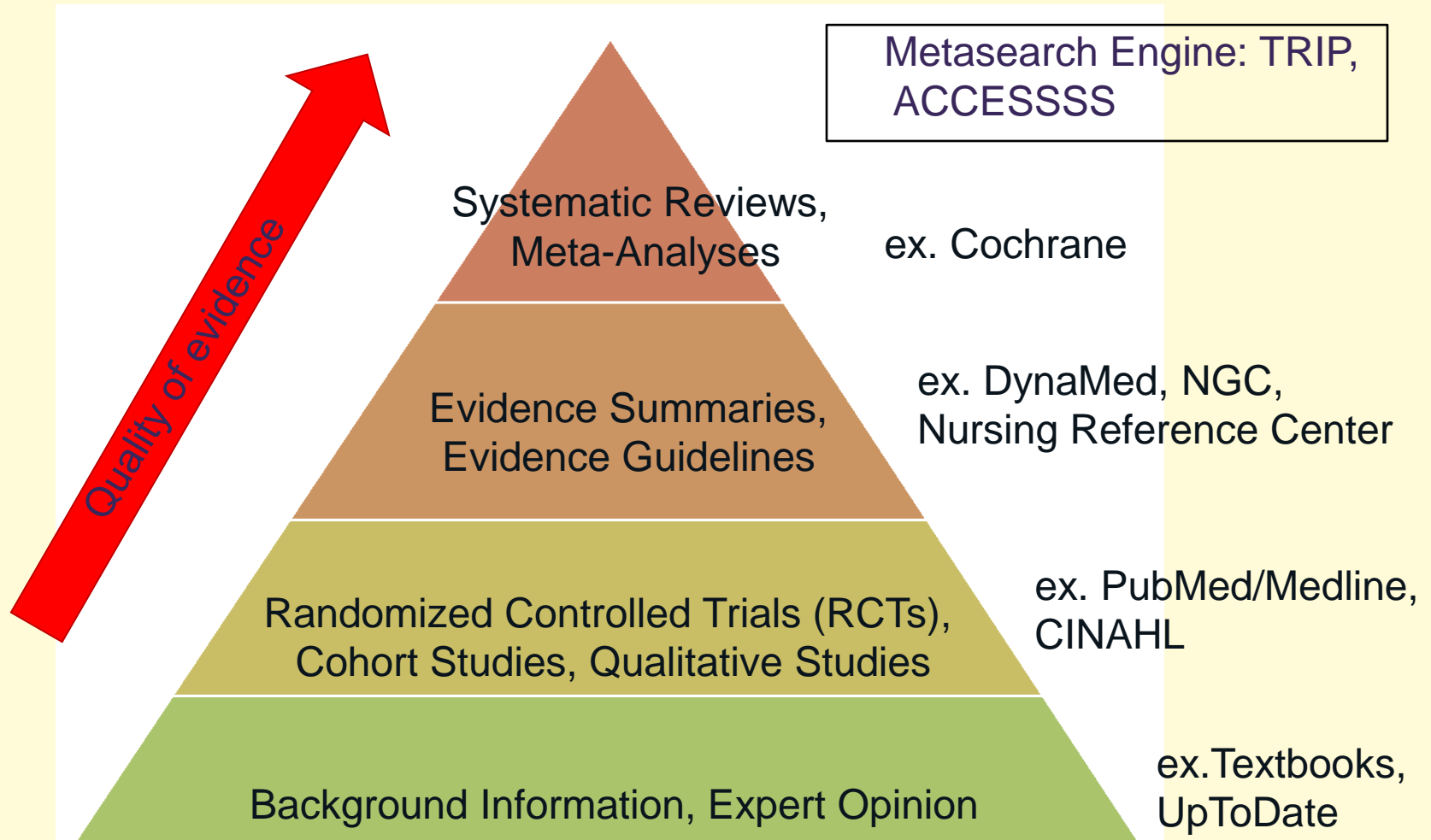


6S Pyramid



Background Information: ex. Textbooks, UptoDate

Evidence Pyramid





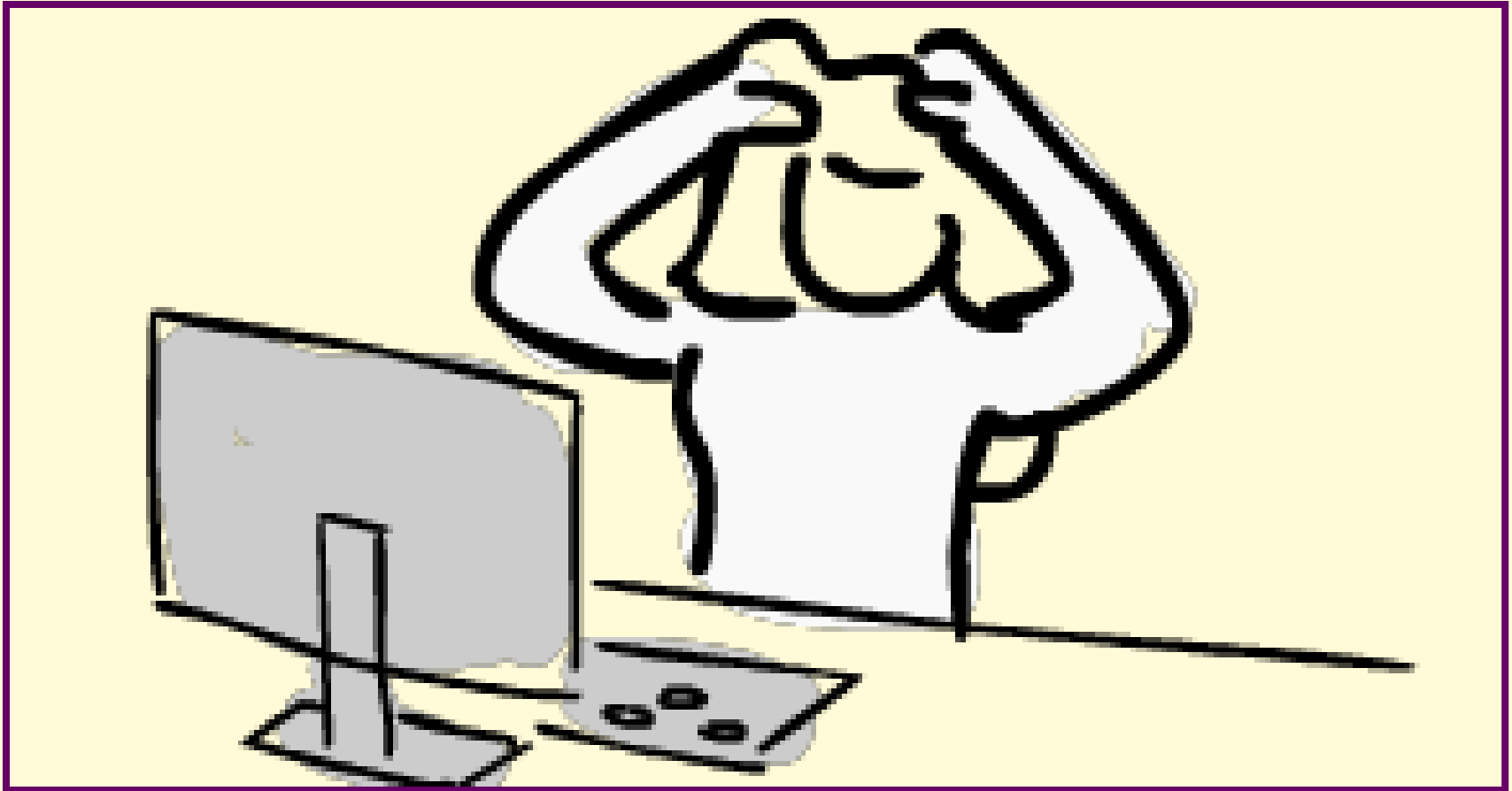
#1 Question:

Does bar coding reduce medication errors in hospitals?

#2 Clinical Question:

What is the effect of wound cleansing solutions and wound cleansing techniques on the rate of healing of pressure ulcers?

Where to look for evidence-based information? Where to begin?



By Pictofigo CC-BY-SA-3.0

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Clarify your Question with PICO

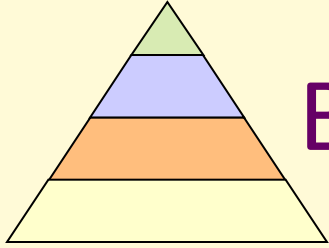
- **P**atient, population or problem?
- **I**ntervention?
- **C**omparison?
- **O**utcome?

PICO #1

- P: medication errors in hospitals
- I: bar coding of medicines
- C: no bar codes
- O: reduction of medication errors

PICO #2

- P: Pressure ulcers [for hospitalized patients]
- I: cleansing techniques
- C: comparing wound cleansing with no wound cleansing, or different wound cleansing solutions, or different cleansing techniques
- O: improved healing of pressure ulcers

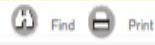


Background Information: Textbooks

- UptoDate *uptodate.com* \$MO
Concise comprehensive up-to-date reviews of clinical topics in multiple specialties
- eBooks
- HEAL-WA eBooks



Prevention of adverse drug events in hospitals



INTRODUCTION

DEFINITIONS

INCIDENCE

- High-risk settings
- High-risk populations
- High-risk drugs

DETECTION METHODS

INTERVENTIONS

- Provider-based approach
 - Avoid and be vigilant of high-risk drugs
 - Discontinue unnecessary drugs
 - Consider drugs as a cause of any new symptom
 - Avoid treating side effects with another drug
 - Avoid drug-drug interactions
 - Adjust dosing based on age and creatinine clearance
 - Address non-adherence
- System-based approach
 - Computerized physician order entry
 - Electronic medication administration record
 - Bar coding
 - Smart pumps
 - Pharmacist interventions
 - Medication reconciliation
 - Other

SUMMARY AND RECOMMENDATIONS

Prevention of adverse drug events in hospitals

Authors

Junya Zhu, PhD, MS, MA
Saul N Weingart, MD, PhD

Section Editor

Tejal K Gandhi, MD

Deputy Editor

Kari Doucette, MD

Disclosures

All topics are updated as new evidence becomes available and our [peer review process](#) is complete. Literature review current through: Dec 2013. | This topic last updated: Aug 29, 2013.

INTRODUCTION — Adverse drug events (ADEs) comprise the largest single category of adverse events experienced by hospitalized patients, accounting for about 19 percent of all injuries [1]. The occurrence of ADEs is associated with increased morbidity and mortality [2,3], prolonged hospitalizations [4], and higher costs of care [2,5].

A 2007 report from the Institute of Medicine estimated that between 380,000 and 450,000 preventable ADEs occurred annually in United States (US) hospitals [6]. Assuming 400,000 preventable ADEs each year at an incremental hospital cost of \$5,857 each [5], the estimated cost of ADEs in 2006 was 3.5 billion US dollars [6]. The Joint Commission on Accreditation of Healthcare Organization has established national patient safety goals requiring each healthcare organization to implement comprehensive medication reconciliation at every transition point (eg, admission, transfer, discharge) along the continuum of care [7].

This topic will focus on interventions to prevent ADEs caused by medication errors in the hospital setting. Specific issues related to hospital discharge, drug prescribing in older adults, and adverse drug reactions are discussed in detail elsewhere. (See "[Hospital discharge](#)" and "[Drug prescribing for older adults](#)" and "[Drug allergy: Classification and clinical features](#)".)

Bar coding — Bar codes can be affixed to medications and patient wristbands in order to ensure matching between patients and their medications at the time of drug administration. Additional interfaces with computerized physician order entry (CPOE) and electronic medication administration record (eMAR) allow for a closed-loop system that confirms a match between medication orders medication preparation (including dispensing), and patients receiving medications. Most importantly, bar coding provides the final opportunity to intercept medication errors before drug administration.

One study found that use of bar coding reduced the administration error rate by 41 percent and potential ADEs by 51 percent [69]. Another study demonstrated that 73 administration errors were intercepted through bar coding for every 100,000 doses charted [70].

Smart pumps — Smart pumps are used to reduce errors associated with intravenous medication administration through their built-in safety features, such as safety alerts, clinical calculators, dose limits, and drug libraries. However, smart pumps have not been consistently found to prevent ADEs. While one study in a pediatric hospital found that the combination of smart pumps, standard drug concentrations, and improved labeling led to a 73 percent reduction in reported medication-infusion errors [71], most other studies reported no significant impact of smart pumps on serious medication errors and ADEs [72-74].

Several barriers undermine the effective implementation of smart pumps, such as inconsistencies in the smart pump drug libraries and bypassing of safety alerts during administration [72,75-77]. A study of 100 hospitals using smart pumps from the same manufacturer suggested substantial variability in drug names, dosing units, dose limits, and concentrations within the same library, which raise the risk of errors and ADEs [75]. Another study found high medication discrepancy rates for



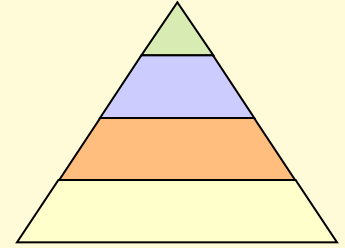
eBooks on HEALWA

healwa.org

- Patient Safety and Quality: An Evidence-Based Handbook for Nurses
- Nelson Textbook of Pediatrics, 2011
- Harrison's Online
- Lippincott Manual of Nursing Practice
- Medical-Surgical Nursing Care



Search Databases Efficiently to Find Research Journal Articles



- **PubMed/MEDLINE** pubmed.gov **HMO**
 - PubMed includes MEDLINE and citations to biomedical journal articles, 1940's+
 - Indexes 5,200 biomedical journals
- **CINAHL** ebscohost.com/biomedical-libraries/the-cinahl-database **\$HMO**
 - Cumulative Index to Nursing and Allied Health Literature
 - Indexes the literature of nursing, biomedicine, alternative/complementary medicine, consumer health and 17 allied health disciplines.

2 PubMed/MEDLINE Strategies for Finding Evidence-Based Citations

1. Use Filters: Article/Publication Types

- Randomized Controlled Trial
- Clinical Trial
- Research Support, US Government
- Meta-Analysis
- Systematic Reviews
- Practice Guideline

2. Use Clinical Queries section of PubMed

2. Use Clinical Queries section

Search: PubMed

medication errors/pc [majr] AND (automatic data processing [mesh] OR "bar code" OR "bar codes" OR "bar coding" OR "bar coded")



PubMed

Enter search terms

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[Clinical Queries](#)

[Topic-Specific Queries](#)

More Resources

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[Journals in NCBI Databases](#)

[Clinical Trials](#)

[E-Utilities](#)

[LinkOut](#)

medication errors/pc [majr] AND (automatic data processing [mesh]
OR "bar code" OR "bar codes" OR "bar coding" OR "bar coded")

Filters

[Clear all](#)

Article types clear

- Clinical Trial** ←
- Research Support, U.S. Government**
- Systematic Reviews
- [More ...](#)

Text availability

- Abstract available
- Free full text available
- Full text available

Publication dates

- 5 years
- 10 years
- Custom range...

Species

Humans

Languages clear

- English** ←
- [More ...](#)

[Clear all](#)

[Show additional filters](#) ←

Display Settings: Summary, 20 per

Results: 12

i Filters activated: Clinical Trial, Research Support, U.S. Government, English. [Clear all](#) to show 153 items.

[Bar-code verification: reducing but not eliminating medication errors.](#)

Henneman PL, Marquard JL, Fisher DL, Bleil J, Walsh B, Henneman JP, Blank FS, Higgins AM, Nathanson BH, Henneman EA.

J Nurs Adm. 2012 Dec;42(12):562-6. doi: 10.1097/NNA.0b013e318274b545.

PMID: 23151928 [PubMed - indexed for MEDLINE]

[Implementing a safe and reliable process for medication administration.](#)

Richardson B, Bromirski B, Hayden A.

Clin Nurse Spec. 2012 May-Jun;26(3):169-76. doi: 10.1097/NUR.0b013e3182503fbc.

PMID: 22504475 [PubMed - indexed for MEDLINE]

[Related citations](#)

[Effect of bar-code technology on the safety of medication administration.](#)

Poon EG, Keohane CA, Yoon CS, Ditmore M, Bane A, Levtzion-Korach O, Moniz T, Rothschild JM, Kachalia AB, Hayes J, Churchill WW, Lipsitz S, Whittemore AD, Bates DW, Gandhi TK.

N Engl J Med. 2010 May 6;362(18):1698-707. doi: 10.1056/NEJMsa0907115.

PMID: 20445181 [PubMed - indexed for MEDLINE] **Free Article**

[Medication dispensing errors and potential adverse drug events before and after implementing bar code technology in the pharmacy.](#)

Poon EG, Cina JL, Churchill W, Patel N, Featherstone E, Rothschild JM, Keohane CA, Whittemore AD, Bates DW, Gandhi TK.

Ann Intern Med. 2006 Sep 19;145(6):426-34.

PMID: 16983130 [PubMed - indexed for MEDLINE]

[Related citations](#)

PubMed Strategy #1: Limit to desired Article Types, e.g., RCTs, Clinical Trial....

PubMed Abstract

N Engl J Med. 2010 May 6;362(18):1698-707. doi: 10.1056/NEJMsa0907115.

Effect of bar-code technology on the safety of medication administration.

Poon EG, Keohane CA, Yoon CS, Ditmore M, Bane A, Levtzion-Korach O, Moniz T, Rothschild JM, Kachalia AB, Hayes J, Churchill WW, Lipsitz S, Whittemore AD, Bates DW, Gandhi TK.

Author information

Abstract

BACKGROUND: Serious medication errors are common in hospitals and often occur during order transcription or administration of medication. To help prevent such errors, technology has been developed to verify medications by incorporating bar-code verification technology within an electronic medication-administration system (bar-code eMAR).

METHODS: We conducted a before-and-after, quasi-experimental study in an academic medical center that was implementing the bar-code eMAR. We assessed rates of errors in order transcription and medication administration on units before and after implementation of the bar-code eMAR. Errors that involved early or late administration of medications were classified as timing errors and all others as nontiming errors. Two clinicians reviewed the errors to determine their potential to harm patients and classified those that could be harmful as potential adverse drug events.

RESULTS: We observed 14,041 medication administrations and reviewed 3082 order transcriptions. Observers noted 776 nontiming errors in medication administration on units that did not use the bar-code eMAR (an 11.5% error rate) versus 495 such errors on units that did use it (a 6.8% error rate)—a 41.4% relative reduction in errors ($P<0.001$). The rate of potential adverse drug events (other than those associated with timing errors) fell from 3.1% without the use of the bar-code eMAR to 1.6% with its use, representing a 50.8% relative reduction ($P<0.001$). The rate of timing errors in medication administration fell by 27.3% ($P<0.001$), but the rate of potential adverse drug events associated with timing errors did not change significantly. Transcription errors occurred at a rate of 6.1% on units that did not use the bar-code eMAR but were completely eliminated on units that did use it.

CONCLUSIONS: Use of the bar-code eMAR substantially reduced the rate of errors in order transcription and in medication administration as well as potential adverse drug events, although it did not eliminate such errors. Our data show that the bar-code eMAR is an important intervention to improve medication safety. (ClinicalTrials.gov number, NCT00243373.)

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Effect of bar-code-assisted medication administration on medication administration or [Am J Health Syst Pharm]

Review Scanning for safety: an integrative approach to improve medication administration or [Comput Inform Biomed]

Review [Can new technologies reduce medication errors in the hospital? A review of medications errors in adult patients] [J Pharm Med]

See

SPECIAL ARTICLE

Effect of Bar-Code Technology on the Safety of Medication Administration

Eric G. Poon, M.D., M.P.H., Carol A. Koehane, B.S.N., R.N.,
Catherine S. Yoon, M.S., Matthew Dimmore, B.A., Annie Bane, R.N., M.S.N.,
Osnat Levstam-Korach, M.D., M.H.A., Thomas Morin, Pharm.D.,
Jeffrey M. Rothschild, M.D., M.P.H., Allen B. Kachalia, M.D., J.D.,
Judy Hayes, R.N., M.S.N., William W. Churchill, M.S., R.Ph., Stuart Lipsitz, Sc.D.,
Anthony D. Whittemore, M.D., David W. Bates, M.D.,
and Tejal K. Gandhi, M.D., M.P.H.

ABSTRACT

From Brigham and Women's Hospital (E.G.P., C.A.K., C.S.Y., M.D., A.B., D.L.K., T.M., J.M.R., A.K., J.H., M.W.C., S.L., A.G.W., D.W.B., T.K.G.); Harvard Medical School (E.G.P., J.M.R., A.B.K., A.D.W., D.W.B., T.K.G.); Partners Information Systems (E.G.P., D.W.B.); and Faulkner Hospital (J.H.) — all in Boston. Address reprint requests to Dr. Poon at the Division of General Medicine (Primary Care), Brigham and Women's Hospital, 100, 1420 Tremont St., Boston, MA 02116, or eepon@partners.org.

N Engl J Med 2012;367:1498-503.
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BACKGROUND

Serious medication errors are common in hospitals and often occur during order transcription or administration of medication. To help prevent such errors, technology has been developed to verify medications by incorporating bar-code verification technology within an electronic medication-administration system (bar-code eMAR).

METHODS

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MeSH: Medical Subject Headings

MeSH Terms

Academic Medical Centers/organization & administration

Automatic Data Processing*

Drug Administration Schedule

Drug-Related Side Effects and Adverse Reactions

Humans

Medical Order Entry Systems*

Medication Errors/prevention & control*

Medication Errors/statistics & numerical data

Medication Systems, Hospital*

Construct a Search using MeSH Headings

- MeSH=Medical Subject Headings
- They are assigned to all indexed articles in PubMed
- MeSH terms describe what the article is about
- *They are key in constructing targeting searches.*



PubMed Clinical Queries

The screenshot shows the PubMed website interface. At the top left is the Med.gov logo and the text "National Library of Medicine National Institutes of Health". To the right is a search bar with "PubMed" selected in a dropdown menu and a search button. Below the search bar is the word "Advanced" in purple. The main content area features a large dark blue box with the "PubMed" logo and a description: "PubMed comprises more than 23 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites." To the right of this box is a "PubReader" section with the text "A whole new way to read scientific literature at PubMed Central" and an image of a tablet displaying a scientific article. Below these sections are three columns of navigation links. The first column, "PubMed", includes links for "Quick Start Guide", "Articles", "FAQs", "Tutorials", and "Noteworthy" with a RSS icon. The second column, "PubMed Tools", includes links for "PubMed Mobile", "Single Citation Matcher", "Batch Citation Matcher", "Clinical Queries", and "Topic-Specific Queries". A large red arrow points to the "Clinical Queries" link. The third column, "More Resources", includes links for "MeSH Database", "Journals in NCBI Databases", "Clinical Trials", "E-Utilities", and "LinkOut".

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medication errors/pc [majr] AND (automatic data processing [mesh] OR "bar code" OR "bar codes" OR "bar coding" OR "bar coded

Clinical Study Categories

Category:

Scope:



Results: 5 of 22

Bar-code-assisted medication administration: a method for predicting repackaging resource needs.

Strykowski J, Hadsall R, Sawchyn B, VanSickle S, Niznick D. Am J Health Syst Pharm. 2013 Jan 15; 70(2):154-62.

Review article: improving drug safety for patients undergoing anesthesia and surgery.

Orser BA, Hyland S, U D, Sheppard I, Wilson CR. Can J Anaesth. 2013 Feb; 60(2):127-35. Epub 2012 Dec 22.

Effects of cabinets

Helmons P. Am J Health

Minimizing and administration management

Hakala JL, Hung JC, Mosman EA.

J Nucl Med Technol. 2012 Sep; 40(3):183-6. Epub 2012 Jun 5.

Systematic Reviews

Results: 4 of 4

Barcode medication administration work-arounds: a systematic review and implications for nurse executives.

Voshall B, Piscotty R, Lawrence J, Targosz M. J Nurs Adm. 2013 Oct; 43(10):530-5.

Bar code technology and medication administration error.

Young J, Slebodnik M, Sands L. J Patient Saf. 2010 Jun; 6(2):115-20.

Modelling the expected net benefits of interventions to reduce

Thomas N,

Patterson ES, Rogers ML, Render ML.

Jt Comm J Qual Saf. 2004 Jul; 30(7):355-65.

Minimizing human error in radiopharmaceutical preparation and administration via a bar code-enhanced nuclear pharmacy management system.

Hakala JL, Hung JC, Mosman EA. J Nucl Med Technol. 2012 Sep; 40(3):183-6. Epub 2012 Jun 5.

Finding Qualitative Research

- Use appropriate Medical Subject Headings (MeSH) terms in your search, such as:
 - *Qualitative Research*
 - *Focus Groups*
 - *Interviews as Topic*
 - *Nursing Methodology Research*, and more

Search PubMed for Qualitative Research

Qualitative research AND medication errors/pc AND
(automatic data processing [mesh] OR "bar code" OR
"bar codes" OR "bar coding" OR "bar coded")

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U.S. Government
More ...

Text availability

Abstract available
Free full text available
Full text available

Publication dates

5 years
10 years
Custom range...

Species

Humans

Results: 2



- [Pharmacy workers' perceptions and acceptance of bar-coded medication technology in a pediatric hospital.](#)
 1. Holden RJ, Brown RL, Scanlon MC, Karsh BT.
Res Social Adm Pharm. 2012 Nov-Dec;8(6):509-22. doi: 10.1016/j.sapharm.2012.01.004. Epub 2012 Mar 13.
PMID: 22417887 [PubMed - indexed for MEDLINE] **Free PMC Article**
[Related citations](#)

- [Smart medical environment at the point of care: auto-tracking clinical interventions at the bed side using RFID technology.](#)
 2. Ohashi K, Ota S, Ohno-Machado L, Tanaka H.
Comput Biol Med. 2010 Jun;40(6):545-54. doi: 10.1016/j.combiomed.2010.03.007. Epub 2010 May 14.
PMID: 20471637 [PubMed - indexed for MEDLINE]
[Related citations](#)

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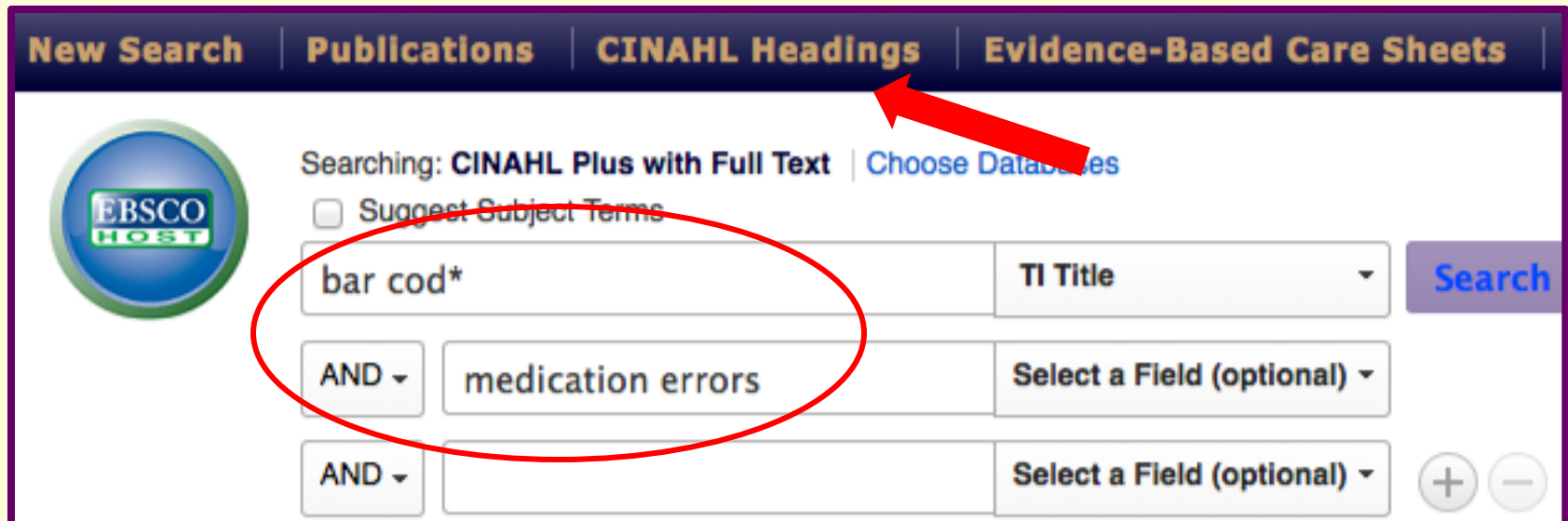
Try this...	Tell PubMed...
Start with a keyword search	Enter keywords (and synonyms for these terms) you would expect to find in an <i>article title</i> or <i>abstract</i> [PubMed does not search the full text of articles.]
Search by phrase (“ ”)	Add quotations around words to tell PubMed to find an <i>exact phrase</i>
Search for words in the title [ti]	PubMed to search for words in article titles [Do not use this for comprehensive searches.] Ex: “pressure ulcer”[ti] AND mattress[ti] .
Use Limits	Limit your results by <i>type of article, date range, age group, journal sets</i> , and more.
Search by Author [au]	Search PubMed for a particular author Ex: Rivara FP[au]
Find Related Citations	In the <i>abstract view</i> , take a look at <i>the related citations</i> generated for a particular article (right hand side of page)

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Effect of bar-code-assisted medication administration on medication administration errors.



M. Hassink, Jeroen J.; Duisenberg-Van Essenberg, Marjolijn; Roukema, Jan A.; American Journal of Health-System Pharmacy, 2013 Apr 1; 70 (7): 572-3. (journal article - letter, **research**) ISSN: 1079-2082 PMID: 23515508

Subjects: Medication Errors Classification; Bar Coding Utilization; Medication Systems Statistics and Numerical Data

CINAHL Results

Academic Journal  [PDF Full Text](#) (61.7KB)



Challenges implementing bar-coded medication administration in the emergency room in comparison to medical surgical units.



(includes abstract) Glover, Nancy; CIN: Computers, Informatics, Nursing, 2013 Mar; 31 (3): 133-41. (journal article - **research**, tables/charts) ISSN: 1538-2931 PMID: 23321481

Bar-coded medication administration has been successfully implemented and utilized to decrease medication errors at a number of hospitals in recent years. The purpose of this article was to discu...

Subjects: Bar Coding; Emergency Service; Hospital Units; Medication Errors Prevention and Control; Medication Systems Utilization

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Bar-code-assisted medication administration: A method for predicting repackaging resource needs.



(includes abstract) Strykowski, Jill; Hadsall, Ron; Sawchyn, Bethany; VanSickle, Stacey; Niznick, Dan; American Journal of Health-System Pharmacy, 2013 Jan 15; 70 (2): 154-62. (journal article - **research**, tables/charts) ISSN: 1079-2082 PMID: 23292270

Purpose. Results of a study at two hospitals to validate and test systems for bar-code-assisted medication administration (BCMA) are reported, including data on bar-code scanning failures and BCM...

Subjects: Bar Coding Methods; Medication Systems Utilization; Medication Errors Prevention and Control; Pharmacy Service Administration

Optimizing the use of a bar code medication administration system for newborn patients using a lean methodological framework.



(includes abstract) Jutila, Amy; College of St. Scholastica, 2013; D.N.P. (85 p) (doctoral dissertation - **research**) ISBN: 978-1-303-06544-6

Bar code medication administration (BCMA) systems are being implemented in hospitals as a way to prevent medication errors at the bedside. Although these systems can have a significant impact on ...

Subjects: Bar Coding; Medication Errors Prevention and Control; Medication Systems in Infancy and Childhood; Infant, Newborn: birth-1 month

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Bar-code Verification: Reducing but not Eliminating Medication Errors.



Henneman, Philip L.; Marquard, Jenna L.; Fisher, Donald L.; BLeil, Justin; Walsh, Brendan; Henneman, Justin P.; Blank, Fidela S.; Higgins, Ann Marie; Nathanson, Brian H.; Henneman, Elizabeth A.; Journal of Nursing Administration, 2012 Dec; 42 (12): 582-6. (journal article - **research**, tables/charts) ISSN: 0002-0443 PMID: 23151928

Subjects: Medication Errors Prevention and Control; Bar Coding; Medication Systems

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Effect of bar-code-assisted medication administration on medication error rates in an adult medical intensive care unit.



(includes abstract) DeYoung JL; Vanderkooi ME; Barletta JF; American Journal of Health-System Pharmacy, 2009 Jun 15; 66 (12): 1110-5. (journal article - glossary, **research**, tables/charts) ISSN: 1079-2082 PMID: 19498127

PURPOSE: The effect of bar-code-assisted medication administration (BCMA) on the rate of medication errors in adult patients in a medical intensive care unit (ICU) was studied. METHODS:

Finding Qualitative Research in CINAHL

- Use appropriate CINAHL Subject Headings
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1. Riordan J, Voegeli D.
Br J Nurs. 2009 Nov 12-25;18(20):
PMID: 20081668 [PubMed - index
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Therapists' roles in pressure

2. Guihan M, Hastings J, Garbe
J Spinal Cord Med. 2009;32(5):56
PMID: 20025152 [PubMed - index
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3. Jünger M, Ladwig A, Bohbot
J Wound Care. 2009 Nov;18(11):4
PMID: 19901877 [PubMed - index
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Publisher: American Academy of Ambulatory Care Nursing

Subject: [Medicine and Health Sciences -- Nursing](#)

AACN advanced critical care

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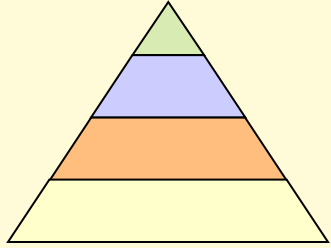
ISSN: 1559-7768 Online ISSN: 1559-7776

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'pressure ulcers wound cleansing'

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National Guideline Clearinghouse
guideline.gov

1. **Pressure ulcer prevention and treatment protocol. Health care protocol.** 2008 Jan (revised 2012 Jan). NGC:008962
Institute for Clinical Systems Improvement - Nonprofit Organization. [View all guidelines by the developer\(s\)](#)
2. **Pressure ulcer treatment recommendations. In: Prevention and treatment of pressure ulcers: clinical practice guideline.** 2009. NGC:008204
European Pressure Ulcer Advisory Panel - Independent Expert Panel; National Pressure Ulcer Advisory Panel - Independent Expert Panel. [View all guidelines by the developer\(s\)](#)
3. **Association for the Advancement of Wound Care guideline of pressure ulcer guidelines.** 2010 Oct 1. NGC:008120
Association for the Advancement of Wound Care - Nonprofit Organization. [View all guidelines by the developer\(s\)](#)
4. **Guideline for management of wounds in patients with lower-extremity neuropathic disease.** 2004 (revised 2012 Jun 1). NGC:009275
Wound, Ostomy, and Continence Nurses Society - Professional Association. [View all guidelines by the developer\(s\)](#)
5. **Pressure ulcers in the long-term care setting.** 1996 (revised 2008; reaffirmed 2013). NGC:006410
American Medical Directors Association - Professional Association. [View all guidelines by the developer\(s\)](#)
6. **Association for the Advancement of Wound Care (AAWC) venous ulcer guideline.** 2005 (revised 2010 Dec). NGC:008984
Association for the Advancement of Wound Care - Nonprofit Organization. [View all guidelines by the developer\(s\)](#)
7. **Guideline for prevention and management of pressure ulcers.** 2003 (updated 2010 Jun 1). NGC:007973
Wound, Ostomy, and Continence Nurses Society - Professional Association. [View all guidelines by the developer\(s\)](#)

View Guideline Synthesis

Guideline Title

Pressure ulcer prevention and treatment protocol. Health care protocol.

Bibliographic Source(s)

Institute for Clinical Systems Improvement (ICSI). Pressure ulcer prevention and treatment protocol. Health care protocol. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2012 Jan. 88 p. [112 references]

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Guideline Classification

Related Content

- Scope
- Methodology
- Recommendations
- Evidence Supporting the Recommendation
- Benefits/Harms of Implementing the Guideline
- Contraindications

- Qualifying Statements
- Implementation of the Guideline

Recommendations

Major Recommendations

Note from the National Guideline Clearinghouse

what has changed since the previous version

The recommendations for treatment of pressure ulcers are accompanied by detailed annotations. Algorithms for inpatient (inpatient algorithm) and Pressure Ulcer Prevention (outpatient algorithm)

Class of evidence (A-D, M, R, X) ratings and

Clinical Highlights

- **Risk assessment** should be performed. For inpatient, use the Braden Q Scale. (Annotation #1;)
- A **skin inspection** should be done depending on the status of the patient
- The **pressure ulcer prevention** includes off-loading, manage moisture, and
- **Pressure ulcer treatment** should

Wound Cleansing

Wound healing is optimized and risk of infection is reduced when surface bacteria, necrotic tissue, exudates, metabolic wastes, and residue of wound care products are removed from the wound. Routine wound cleansing is used for both necrotic and clean wounds. Routine wound cleansing should be accomplished with minimal chemical or mechanical trauma to the tissue [M]. Traumatized wounds have a greater risk of infection and slower healing rate. The process of cleansing a wound involves selection of both a wound cleansing solution and a mechanical means of delivering that solution to the wound.

Goals of Cleansing

- Remove non-viable tissue, bacteria, bacterial toxins from the wound surface
- Protect healing wound
- Facilitate wound assessment by optimizing visualization of wound

General Points of Cleansing

- Cleanse the wound initially and at each dressing change
- Use universal precautions to minimize risk of cross-contamination
- Minimize mechanical force when cleansing ulcer with gauze, cloth, or sponges

Mechanical Cleansing Procedure

Work in a circular pattern, starting at the center of the wound to gently cleanse the wound with the moistened gauze. Work toward the edge of the wound and surrounding skin. Remove loose tissue with the gauze pad. Do not press hard or scrub a clean wound because this will damage the tissue and slow healing. Do not return to the wound center after cleansing, to avoid recontamination of the wound.

Antimicrobials and Cleansers



Normal saline is a safe and effective cleanser for all wounds. Normal saline is physiologic and will not harm tissue. It will adequately cleanse most wounds if a sufficient amount is used to thoroughly flush the wound. Although normal saline is the cleanser of choice in the hospital, it does not contain a preservative, so bacteria starts to colonize once the sealed bottle is open. Therefore, hospital protocols often advise discarding any unused saline after 24 hours.

Drinkable tap water is as effective as saline to cleanse a wound. Cleansing can be done under running water in a sink or preferably in the shower. Immunosuppressed patients should not use tap water [M].

For the clean granulating wound, cytotoxic cleaning agents are not indicated. However, when a wound is suspected to have critical colonization or infection, topical antimicrobials are indicated (e.g., povidone-iodine, sodium hypochlorite solution, hydrogen peroxide or acetic acid) for a time-limited period (usually two weeks) [R]. For wounds with evidence of a heavy bioburden, use agents and dilutions that


National Guideline Clearinghouse Guideline Comparison

Guideline Comparison

Guideline Title	Pressure ulcer prevention and treatment protocol. Health care protocol.	Association for the Advancement of Wound Care guideline of pressure ulcer guidelines.
Date Released	2008 Jan (revised 2012 Jan)	2010 Oct 1
Guideline Developer(s)	Institute for Clinical Systems Improvement - Nonprofit Organization	Association for the Advancement of Wound Care - Nonprofit Organization
Intended Users	Advanced Practice Nurses Allied Health Personnel Dietitians Health Care Providers Health Plans Hospitals Managed Care Organizations Nurses Occupational Therapists Physical Therapists Physician Assistants Physicians	Advanced Practice Nurses Allied Health Personnel Health Care Providers Health Plans Hospitals Managed Care Organizations Nurses Physical Therapists Physician Assistants Physicians Podiatrists Public Health Departments
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Availability of Original Guideline	View original (full-text) guideline 	View original (full-text) guideline 

Searching CINAHL for Pressure ulcer cleansing


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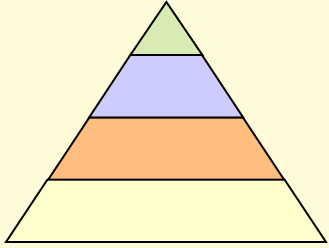
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- [Guideline for the management of wounds in patients with lower-extremity neuropathic disease: an executive summary.](#)
Crawford PE, Fields-Varnado M; WOCN Society.
J Wound Ostomy Continence Nurs. 2013 Jan-Feb;40(1):34-45. doi: 10.1097/WON.0b013e3182750161.
PMID: 23222969 [PubMed - indexed for MEDLINE]



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Pressure ulcer

Updated 2014 Jan 06 06:48:00 PM: topical atorvastatin may reduce size of stage I or II pressure ulcers (Pharmacotherapy 2014) [view update](#)

Related Summaries:

- o Diabetic foot ulcer
- o Venous ulcer
- o Osteomyelitis
- o Cellulitis
- o Peripheral arterial disease (PAD) of lower extremities

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Patient Information


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References

Wound cleansing:

- cleanse wound initially and with each dressing change, normal saline preferred agent⁽¹⁾
- ulcer wounds should not be cleaned with skin cleansers or antiseptic agents (such as povidone-iodine hydrogen peroxide, acetic acid) because they destroy granulation tissue (grade B recommendation [inconsistent or limited evidence])⁽¹⁾
- **insufficient evidence to support or refute use of wound cleansing for pressure ulcers**
 - based on Cochrane review
 - systematic review of 3 randomized trials evaluating wound cleansing solutions or wound cleansing techniques in 169 patients with pressure ulcers
 - no trials compared wound cleansing vs. no cleansing
 - saline spray containing aloe vera, silver chloride, and decyl glucoside (Vulnopur) significantly improved Pressure Sore Status Tool scores vs. isotonic saline in 1 trial with 126 patients
 - data were insufficient to compare tap water vs. saline in 1 trial with 8 patients
 - Reference - [Cochrane Database Syst Rev 2013 Mar 28;\(3\):CD004983](#)

Nonsurgical debridement methods:

- mechanical debridement (may be painful, viable tissue may be removed with necrotic tissue) - methods include^(1, 2)
 - wet-to-dry dressings
 - hydrotherapy via whirlpool bath
 - wound irrigation
 - **addition of pulsatile lavage treatment to standard dressing care may improve healing of pressure ulcers in adults with spinal cord injury (level 2 [mid-level] evidence)**
 - based on small randomized trial
 - 28 adults (mean age 56 years) with spinal cord injury and stage III-IV pelvic pressure ulcers randomized to 1 of 2 groups for 3 weeks
 - daily low pressure pulsatile lavage (normal saline 1 L at 11 pound-force/inch²) plus standard dressing changes
 - sham treatment plus standard dressing changes
 - pulsatile lavage associated with improvements over 3 weeks in depth, width, length, and volume of pressure ulcer ($p < 0.001$ for all)
 - Reference - [Phys Ther 2012 Jan;92\(1\):38](#)  [EBSCOhost Full Text](#)
- enzymatic - preparations available in United States include collagenase and papain/urea with or without chlorophyll^(1, 2)
 - slower than other methods, may be painful
 - useful for patients who cannot tolerate sharp debridement
 - should not be used if infection present
 - **collagenase ointment may be better than placebo for nonsurgical debridement of ulcers (level 2 [mid-level] evidence) but insufficient evidence for comparison with other debridement agents**
 - based on systematic review of mostly low-quality trials
 - systematic review of 10 randomized trials and 2 prospective cohort studies evaluating collagenase ointment for debridement of pressure ulcers, leg ulcers, or burn wounds
 - most trials small with multiple methodologic flaws, including lack of blinding, baseline differences, subjective assessment measures, inadequate report of outcomes
 - collagenase associated with
 - more rapid removal of necrotic tissue from pressure ulcer wounds vs. sham ointment in 3 trials with 81 patients
 - slower removal of necrotic tissue from pressure ulcer wounds vs. papain-urea ointment in 1 trial with 26 patients

Level of evidence

Level of evidence

Guidelines:


Guideline comparison:

- synthesis of 2 guidelines (RNAO 2007, WOCN 2010) on management of pressure ulcers can be found at [National Guideline Clearinghouse 2011 Jan 24:16417](#)
- synthesis of 2 guidelines ([HIGN 2008, WOCN 2010) on prevention of pressure ulcers can be found at [National Guideline Clearinghouse 2011 Jan 24:25078](#)

International guidelines:

- international expert evidence-based recommendations for negative pressure wound therapy: treatment variables (pressure levels, wound filler and contact layer) can be found in [J Plast Reconstr Aesthet Surg 2011 Sep;64 Suppl:S1](#)
- European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel international guidelines
 - prevention of pressure ulcers can be found at [National Pressure Ulcer Advisory Panel 2009 PDF](#) or in [Spanish PDF](#) or in [Japanese PDF](#)
 - treatment of pressure ulcers can be found at [European Pressure Ulcer Advisory Panel 2009 PDF](#) or in [Japanese PDF](#)
- Italian Society of Infectious Tropical Diseases (Societa Italiana di Malattie Infettive e Tropicali)/International Society of Chemotherapy (SIMIT/ISC) guideline on diagnosis and management of skin and soft-tissue infections can be found in [J Chemother 2011 Oct;23\(5\):251](#)

United States guidelines:

- Institute for Clinical Systems Improvement (ICSI) pressure ulcer prevention and treatment protocol can be found at [ICSI 2012 Jan PDF](#) or at [National Guideline Clearinghouse 2012 Jul 30:36059](#)
- Agency for Healthcare Research and Quality, formerly Agency for Health Care Policy and Research (AHCPR), guidelines on
 - treatment of pressure ulcers can be found at [AHCPR 1994 Dec](#)
 - prevention of pressure ulcers can be found at [AHCPR 1992](#)
- Association for the Advancement of Wound Care (AAWC) guideline on pressure ulcer guidelines can be found at [AAWC 2010 Oct 1 PDF](#) or at [National Guideline Clearinghouse 2011 Aug 1:24361](#)
- Wound Healing Society guideline on treatment of pressure ulcers can be found in [Wound Repair Regen 2006 Nov-Dec;14\(6\):663](#) 
[EBSCOhost Full Text](#) full-text
- HIGN protocols for best practice of preventing pressure ulcers and skin tears can be found at [National Guideline Clearinghouse 2008 Jan 10:12262](#)

Levels and Grades of Evidence

Levels of Evidence and Grades of Recommendations

Grade of recommendation	Level of evidence	Interventions
A	1a	Systematic review of randomized controlled trials
	1b	Individual randomized controlled trial
B	2a	Systematic review of cohort studies
	2b	Individual cohort study
	3a	Systematic review of case-control studies
	3b	Individual case-control study
C	4	Case series
D	5	Expert opinion without explicit critical appraisal or based on physiology or bench research

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[Pressure Ulcers: Therapy -- Negative Pressure](#)

[Pressure Ulcers: Treatment](#)  ←

[Pressure Ulcers: Use of Pressure-Redistributing Devices](#) 

Key Content

Diseases & Conditions includes:

- **Quick Lessons**

Clinically-organized nursing overviews that are designed to map the nursing work flow

- **Evidence-Based Care Sheets** 

Evidence-based summaries on key topics incorporating the best available evidence through rigorous systematic surveillance

Nursing Reference Center: Evidence-Based Care Sheet

EVIDENCE-BASED CARE SHEET

Pressure Ulcers: Treatment

What We Know

- Pressure ulcers (PUs), also called decubitus ulcers, pressure sores, and bedsores, are localized areas of skin and soft tissue breakdown, caused mainly by prolonged pressure, friction, and shear forces, that can result in ischemia, cell death, and tissue necrosis.^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,884,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,926,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000}

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- Exogenous stimulation to promote fibroblast and macrophage collagen growth and DNA synthesis to increase the number of receptors for growth factors.^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,884,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,926,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000}

What We Can Do

- Learn more about PUs—including risk factors, symptoms, staging, assessment, and prevention and treatment interventions—so you can accurately assess your patients' personal characteristics and health education needs. Share this knowledge with your colleagues.
- On admission, assess all your patients for existing PUs and for PU risk. Document findings.
 - Use a risk assessment scale (e.g., Braden, Norton) and ask the patient/patient's family if there is a history of PUs.¹
- Classify the highest risk patients at least daily for PUs, especially at sites of bony prominences. Perform a skin care to evaluate based three. Check for bruising, sores, redness, warmth, swelling, induration, and cracks.
 - If applicable, note color, size, location, and depth of PU, and if induration changes in pattern.
- Discuss the status and condition of existing PUs using an accepted staging system (assessment tool) (e.g., the Pressure Ulcer Scale for Healing [PUSH]) tool.²
- Report relevant information to a wound specialist, wound specialist, dermatologist, plastic and reconstructive surgeon, and registered dietitian to create health care plan and coordinate care for individuals with PUs.
- Adopt a risk assessment tool based on the stage and severity of the PU. Principles of nursing care and treatment for all wound stages include the following:^{3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857}

Nursing Reference Center: Quick Lesson

quickLESSON about...

Pressure Ulcers: Therapy – Dressings

Description/Etiology

A pressure ulcer (PU) is a wound caused by physical compression of tissue that impairs local blood flow, leading to ischemia and subsequent necrosis of skin and underlying structures. Standard treatment involves relieving pressure on the PU, debridement, wound irrigation, dressing changes, pain management, prevention or resolution of infection, and ensuring good hygiene and nutrition. For more information on PU, including standard treatment, see *Quick Lesson About...Pressure Ulcers: Therapy – an Overview*.

Dressing changes are an integral part of PU treatment. A dressing helps maintain a clean, moist wound environment that promotes healing; an effective dressing shields the area from damage, prevents the PU from drying out, and shields the wound from outside contaminants and injury. Dressings are also used to fill dead space and to protect surrounding skin. Most dressings are classified as films, foam blends, hydrocolloids, polyurethane-based composites, alginate, or silicone gels, hydrogels, or gauze. (For details, see *Treatment Goals, below*.) Both occlusive dressings (e.g., hydrocolloids, hydrogels) and semiocclusive dressings (e.g., transparent films) facilitate analytic debridement because they promote a supportive environment for normal physiologic enzyme breakdown of necrotic tissue. Compared to white gauze, hydrocolloids tend to be changed less often, are more absorbent, and cause less pain during dressing changes. Sequential treatment with hydrocolloids and adhesive alginate produces better results than hydrocolloid alone. During dressing changes, the entire dressing should be removed (unless otherwise specified by the clinician), and the PU should be cleaned with normal saline (e.g., 0.9% sodium chloride solution) unless an alternate solution is ordered. The choice of dressing prescribed depends on PU characteristics (e.g., stage, diameter, depth, amount of exudate, bacterial load, anatomical location (e.g., over a bony point), or irregularly shaped body surface; over a sensitive point), and the patient's comorbid status. Dressing selection should be based, in part, on cost effectiveness; appropriate selection and correct application both require skill and knowledge.

Stage I PUs may not require a dressing unless the patient is incontinent or the wound bed is subject to ongoing friction; simple non-adhesive dressings are used above the patient's tolerance or for wound that require occlusion. Stage II PUs are often treated with occlusive dressings. Multiple dressing options are available for stage III and IV PUs. (For information on staging PUs, see *Quick Lesson About...Pressure Ulcers: Staging*.)

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To determine treatment efficacy, it is important to monitor and document details of PU size, margins, and the surrounding skin; healing status is commonly documented by serial photographic diagnosis, detailed written descriptions, and measurement of wound dimensions. Monitoring scales are used in some facilities. If the PU does not show clinical improvement in 2-4 weeks, the treatment plan may need to be revised.

Facts and Figures

PU's cause significant morbidity and mortality, especially in patients with impaired sensation, prolonged immobility, or advanced age. Severity present at stage II PU's heal within 6 months of the start of treatment but only 33% of stage III and 50% of stage IV PU's heal within 6 months.

Risk Factors

Risk factors for PU's include decreased mobility, decreased activity level, anxiety, debility, obesity, incontinence, and increased friction on the skin, particularly over bony prominences.

Signs and Symptoms/Clinical Presentation

For information on clinical presentation, see *Quick Lesson About...Pressure Ulcers: Staging*, referenced above.

Assessment

Physical Findings of Particular Interest

- Assessment of risk factors for PU development and infection is vital for appropriate treatment of existing wounds and prevention of complications and additional PU's; physical assessment may reveal previous PU's sites or current PU's, localized or systemic infection, poor overall health status, the presence of comorbid conditions, poor nutritional status, and altered wound status.
- Assessment of a PU should include:
 - size, depth, and extent of undermining
 - earlier appearance (e.g., necrotic or viable tissue)

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- wound exudates (e.g., amount, color, odor, and consistency)
- periwound tissue color (e.g., pigmented, necrotic, anesthetic, or viable)
- evaluating for the presence of foreign bodies (e.g., debris, fragments of dressing)

Treatment Goals

Maintain Optimal Physiological Status and Reduce Risk of Complications

- For PU treatment strategies intended to dressings, see other *Quick Lessons* in the pressure ulcers series.
- Inspect skin and perform skin care daily or more frequently, as necessary, to patients who are incontinent; ensure good hygiene using mild soap, a water dressing to gently pat completely dry, and skin moisturizer applied to prevent chafing or dry skin.
 - Avoid moisture accumulation on skin, chafing, or binding.
 - Avoid dragging the patient during transfers or position changes.
- Frequently assess for readiness to the PU's treatment readiness to promote healing or absorb exudates; monitor to avoid excoriation, as ordered.
- Assess pain level, premedicate for pain prior to changing the dressing.
- Deal with dressing changes, as ordered, including the following:
 - (Occlusive) Adhesive holds secure and is used above to stage I-III PUs or with hydrogels and hydrocolloids in stage III-IV PUs; change daily, as ordered.
 - (Foaming) Is a water- or glycerin-based gel available to protect, dress, granulate, and fill in cracks, fissures, reduce pain, and address dehydration, and fill dead space, it is easy to apply and remove; change 1-4 times per day, as ordered.
 - (Hydrocolloid) and the PU will become a gel when they absorb exudate; available in wafers, pads, and pieces; protects the PU from bacterial contamination and facilitates analytic debridement; change every 1-7 days, as ordered.
 - Alginate are sterile, absorbent dressings made from seaweed; they are highly absorbent, conform to the shape of the PU's, facilitate moisture debridement, pain control, and absorb exudate; change daily, as ordered.
 - Foam, composed of polyurethane, can fill a wound cavity, absorb exudate, protect skin from incontinence, and does not adhere to the PU's; recommended for leg ulcers; change every 1-7 days, as ordered.
 - Silver or zinc gauze keeps the PU moist; change 1-3 times per day, as ordered.
 - The gauze dressing impregnated with petroleum, hypochlorite saline, or saline-solution maintains a moist wound environment; hyperoxide saline and saline solutions are antimicrobial; change 1-4 times per day, as ordered.

Provide Emotional/Psychological Support and Educate

- Assess anxiety level and coping ability of patient and family; educate and encourage discussion about the importance of strict adherence to the treatment regimen.

Food for Thought

- Medical grade honey has been suggested as a treatment for PU's due to its antimicrobial, anti-inflammatory, antioxidant-promoting, and moisture-retaining properties. However, there is not enough evidence to establish its effectiveness.
- A recent systematic review compared different treatment models for pressure ulcers and found little evidence to support the use of a particular support surface or dressing (Reddy et al., 2008).
- Biological agents (e.g., transforming growth factor beta-1, nerve growth factor, and fibroblast growth factor) have recently been introduced as adjunct therapy for chronic wounds and PU's (Lew, 2010).
- Woundite[®], a first-line natural hydrogel product for wound debridement of PU's in Australia, decreases debridement time, healing time and overall length of hospitalization (Nelson, 2011).

Red Flags

- Check PU sites 1-2 hours to monitor efficacy of dressing therapy.
- Prevent maceration of skin surrounding the PU by avoiding using tape, keeping the dressing wrap from touching skin, using wet/dry or hydrocolloid pad on skin, or using tubular gauze to isolate a dressing.
- Do not use wet-to-dry gauze as a PU dressing; wet-to-dry gauze should be used for debridement only.

What Do I Need to Tell the Patient/Patient's Family?

- Follow the individualized wound care instructions; monitor for signs and symptoms of infection and seek immediate medical attention for new or worsening wound problems.

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Nursing Reference Center: Skill Competency Checklist

SKILL COMPETENCY checklist	
Wound Dressings: Pressure	
Standard Met/Initials	Competency Areas
	Prerequisite Skills
	Knowledge of the mechanism whereby a pressure dressing promotes clotting and hemostasis in a bleeding wound
	Recognition of excessive bleeding as a medical emergency; demonstrated ability to prioritize nursing actions based on source of bleeding (e.g., arterial versus venous), extent of blood loss, and presence or absence of other injuries
	Knowledge of facility protocol concerning procedure; if applicable, participation in specialized training for treatment of patients with traumatic injuries
	Understanding of standard precautions for infection control
	Preparation
	Reviews the treating clinician's orders for wound care, if available
	Reviews facility protocol regarding emergency care
	Identifies patient using facility protocol
	Verifies whether the patient is allergic to latex or other procedure materials or medications. If so, uses alternative materials
	Gathers supplies • Personal protective equipment (PPE), e.g., gown, mask, eye protection, as appropriate • Sterile gauze pads and/or gauze handage roll • Elastic bandages • Adhesive bandage tape • Sterile/non-sterile gloves and other personal protective equipment (PPE), e.g., gown, mask, eye protection, as appropriate • Equipment for assessing vital signs and for performing basic life support (BLS) procedures, as needed • Written information, if available, to reinforce verbal education
	Procedure
	Performs hand hygiene
	Does PPE as appropriate to avoid transfer of microorganisms
	Closes the door to the patient's room and/or draws the curtain around the bed to provide privacy • As appropriate for the situation, introduces self to the patient and family members, if present, and explains clinical role in the provision of pressure dressing application –Evaluates whether the patient/family requires special considerations regarding communication (e.g., due to illiteracy, language barriers, or deafness); makes arrangements to meet these needs, if present –As appropriate, assesses the patient/family for knowledge deficits and anxiety regarding pressure dressing application; provides additional information and emotional support, as needed
	Checks the ABCs (Airway, Breathing, Circulation) of emergency patient assessment; conducts a brief assessment of vital signs, tissue perfusion, and level of consciousness; if the patient is conscious and communicative, provides comfort and explains how help will be provided • Follows facility protocol for cardiopulmonary resuscitation (CPR) and for notification of facility critical care or rapid response team, if indicated
	Quickly observes the area of the bleeding to identify the site and degree of blood loss, as well as the type of wound
	Applies sterile gloves (if time permits), covers the wound with sterile gauze, and applies firm pressure over the gauze to temporarily stop the bleeding
	Elevates the extremity or area of blood loss above the patient's heart to decrease blood loss
	Covers the bleeding area with thick sterile gauze pads

Nursing Reference Center: Patient Education

Title: Pressure Sores By: Wood D, Health Library: Evidence-Based Information, September 1, 2013

Database: Nursing Reference Center

Pressure Sores

(Pressure Ulcers; Bed Sores; Decubitus Ulcers)

Contents

- [Definition](#)
- [Causes](#)
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- [Symptoms](#)
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- [Nutrition](#)
- [Surgery and Other Procedures](#)
- [Prevention](#)

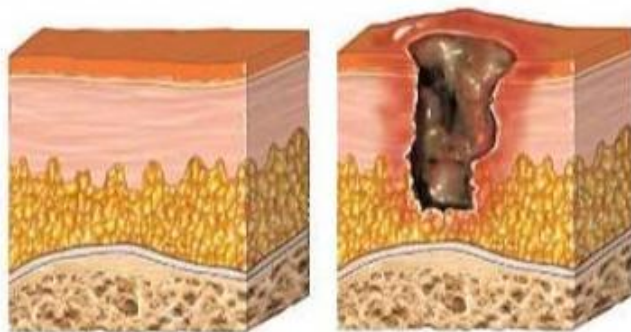
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Definition

A pressure sore is a lesion that develops on the skin and underlying tissues due to unrelieved pressure. The skin and tissues need enough blood supply for oxygen and nutrients. When tissues are compressed for an extended period from hours to days, blood supply can be cut off, leading to a sore.

Pressure Sore (Skin Ulceration)



Normal skin

Ulceration

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Causes

Pressure sores result from lying or sitting in one position for too long a time. Prolonged pressure cuts off the blood supply to tissues that are compressed between a bony area and a mattress, chair, or other object. Without oxygen and nutrients, tissue starts to die.

Several factors contribute to the development of pressure sores including:

September 1, 2013



Continuing Education Credit

Basic Search	Diseases & Conditions	Skills & Procedures	Drug Information	Patient Education	Practice Resources	Continuing Education	Search History/Alerts
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- Provides high-quality, evidence-based information about complementary and alternative medicine
- Includes dietary supplements and integrative therapies
- Grades reflect level of available scientific data + or - the use of therapy for a specific medical condition
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Sunflower oil (*Helianthus annuus*)

Natural Standard Professional Monograph, Copyright © 2013 (www.naturalstandard.com).

Synonyms/Common Names/Related Substances:

• *Abbad el shams* (Egyptian Arabic), *aimindelig solsikke* (Danish), *alpha-linolenic acid (ALA)*, *auringonkukka* (Finnish), *aurigon ruusu* (Finnish), *ayçiçeği* (Turkish), *Corona-solis*, *engelse zonnebloem* (Dutch), *floarea soarelui* (Romanian), *gemeine Sonnenblume* (German), *gewöhnliche Sonnenblume* (German), *girasol* (Spanish), *girasole commune* (Italian), *girassol* (Portuguese), *hae ba ra gi* (Korean), *hariik päevalill* (Estonian), *hélianthe annuel* (French), *Helianthi Annui oleum*, *Helianthus annuus*, *Helianthus annuus L.*, *Helianthus annuus L. ssp. jaegeri* (Heiser) Heiser, *Helianthus annuus L. ssp. lenticularis* (Douglas ex Lindl.) Cockerell, *Helianthus annuus L. ssp. texanus* Heiser, *Helianthus annuus L. var. lenticularis* (Douglas ex Lindl.) Steyerm., *Helianthus annuus L. var. texanus* (Heiser) Shinnars, *Helianthus aridus* Rydb., *Helianthus lenticularis* Douglas ex Lindl., *high-palmitic sunflower oil*, *himawari* (Japanese), *ilianthos* (Greek), *isoauringonkukka* (Finnish), *koujitsuki* (Japanese), *linoleic acid*, *marigold of Peru*, *mirasol* (Filipino), *n-6-polyunsaturated fatty acids*, *napraforgó* (Hungarian), *navadna sončnica* (Slovene), *NuSun®*, *oleic acid rich sunflower oil*, *Oleozon®*, *ozonized sunflower oil*, *podsolnechnik* (Russian), *podsolnechnik maslichnyi* (Russian), *polyunsaturated fatty acids (PUFA)*, *slonecznik* (Polish), *slonecznik roczny* (Polish), *slonecznik zwyczajny* (Polish), *slunečnice roční* (Czech), *Sola Indianus*, *solros* (Swedish), *solsikke* (Norwegian, Danish), *solvendel* (Norwegian), *Sonnenblume* (German), *spóri iliánthu* (Greek), *sunflower oil esters of plant sterols*, *sunflower oil triglyceride emulsion*, *sunflower seed oil*, *suraj mukhi* (Hindi), *tournesol* (French), *xiang ri ku* (Chinese), *zonnebloem* (Dutch)



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Clinical Bottom Line/Effectiveness

Brief Background:

- Sunflower oil is derived from the sunflower plant (*Helianthus annuus*). It was used by Native Americans for its healing properties, applied topically to reduce inflammation, pain, and itching. It was also used to treat poison ivy, snakebites, and rheumatism.
- Other traditional uses for sunflower seeds include constipation, chest pain, ulcers, and warts. In modern times, sunflower oil has aroused interest for such ailments as cardiovascular disease and hyperlipidemia, due to its high vitamin E and polyunsaturated fat content; however, studies published to date have found conflicting evidence regarding the efficacy of sunflower oil for these conditions.
- The anti-inflammatory properties of polyunsaturated fatty acids have also been evaluated, with inconclusive results. Similarly, inconclusive to negative findings have been reported for a number of other indications, including type 2 diabetes and hypertension.

Scientific Evidence for Common/Studied Uses:

Indication	Evidence Grade	
Tinea pedis (athlete's foot)	B	<p>Grading System</p>
Blood clotting disorders	C	
Breast inflammation	C	
Cardiovascular risk reduction	C	
Chronic inflammatory rheumatic disease	C	
Diabetes mellitus type 2	C	
Hyperlipidemia	C	
Atherosclerosis	D	
Hypertension	D	
Peripheral vascular disease	D	
Vitamin A deficiency	D	

Historical or Theoretical Uses That Lack Sufficient Evidence:

- Allergies, Alzheimer's disease, antioxidant (1), arthritis, bed sores (2), constipation, cough, fever, gallstones (3), pain, poison ivy, skin infections, snake bites, ulcers, warts

(Swedish), solsikke (Norwegian, Danish), solvendel (Norwegian), Sonnenblume (German), spóri illánthu (Greek), sunflower oil esters of plant sterols, sunflower oil triglyceride emulsion, sunflower seed oil, suraj mukhi (Hindi), tournesol (French), xiang ri ku (Chinese), zonnebloem (Dutch).



Synonyms/Contraindications



Interactions

Most herbs and supplements have not been thoroughly tested for interactions with other herbs, supplements, drugs, or below are based on reports in scientific publications, laboratory experiments, or traditional use. You should always read your medical condition, or are taking other drugs, herbs, or supplements, you should speak with a qualified healthcare provider for therapy.

Sunflower oil/Drug Interactions:

- **Anticoagulants and antiplatelets:** Based on clinical research, sunflower oil may affect platelet activation and alter (24;25;26;27;28;29). Theoretically, concomitant use of anticoagulant or antiplatelet agents and sunflower oil may increase the risk of bleeding.
- **Antidiabetic agents:** Based on clinical study, sunflower oil may decrease blood glucose (30;31;32;33) as well as insulin resistance. Theoretically, concurrent use of sunflower oil with antidiabetic agents may have additive effects and increase the risk of hypoglycemia.
- **Antilipemic agents:** Based on clinical research, sunflower oil may lower cholesterol (8;13;17;24;24;33;40;42;43;49;59;60;61;62;63). Theoretically, concurrent use of sunflower oil with antilipemic agents may have additive cholesterol-lowering effects.
- **Antiobesity agents:** Clinical studies have reported conflicting findings concerning sunflower oil's effect on body weight. The effect of sunflower oil on antiobesity agents is not well understood.
- **Hematologic agents:** In humans, sunflower oil has been observed to significantly decrease fibrinogen ($p=0.04$) and increase tissue plasminogen activator antigen ($p=0.04$), compared to baseline (40). Sunflower oil has also been shown to decrease chylomicron apoB48 and B100 ($p<0.05$) compared to olive oil (11).
- **Immunosuppressants:** Based on clinical research, sunflower oil may alter antibody levels, cytokine production, and immune response (18;20;36;37;38;39). Theoretically, sunflower may alter or interfere with immunosuppressants.

Sunflower oil/Herb/Supplement Interactions:

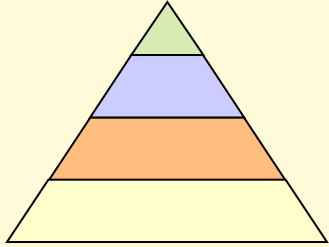
- **Anticoagulants and antiplatelets:** Based on clinical research, sunflower oil may affect platelet activation and alter (24;25;26;27;28;29). Theoretically, concomitant use of anticoagulant or antiplatelet agents and sunflower oil may increase the risk of bleeding.
- **Antiobesity agents:** Clinical studies have reported conflicting findings concerning sunflower oil's effect on body weight. The effect of sunflower oil on antiobesity agents is not well understood.
- **Antioxidants:** Sunflower oil has been found to increase serum alpha-tocopherol and oxidation lag time, and decrease lipid hydroperoxides, and thiobarbituric acid reactive substances in clinical studies (1;5;48;64;65). Sunflower oil has been found to be less effective than olive oil or fish oil and more effective than palm oil in the prevention of lipid oxidation in humans (66). However, consumption, however, resulted in higher free F(2)-isoprostanes ($p=0.003$) and malondialdehyde ($p=0.04$) in one human study (67). Concurrent use of sunflower oil with antioxidants may have additive effects.
- **Antilipemics:** Based on clinical research, sunflower oil may lower cholesterol (8;13;17;24;24;33;40;42;43;49;50;51;59;60;61;62;63). Theoretically, concurrent use of sunflower oil with antilipemic agents may have additive cholesterol-lowering effects.

Abbad erbi, ayçiçeği (Turkish), Sonnenblume (German), hélíanthe à l'huile (French), *Helianthus lenticularis* Douglas ex DC., acid, marigold, acid rich sunflower oil, acids (PUFA), słonecznik (Polish), słonecznik łoczny (Polish), słonecznik zwykły (Polish), slanečnica rožn (Slovenian), solros (Swedish), solsikke (Norwegian, Danish), solvendel (Norwegian), Sonnenblume (German), spóri lílíanthu (Greek), sunflower oil esters of plant sterols, sunflower oil triglyceride emulsion, sunflower seed oil, suraj mukhi (Hindi), tournesol (French), xiang ri ku (Chinese), zonnebloem (Dutch), su (Finnish), wöhnliche Heiser, Heiser, L. var. *lenticularis* (Chinese), linoleic acid, Sun®, oleic acid, saturated fatty acid, sunflower oil

Bed sores and related conditions

Levels of scientific evidence for specific therapies

Grade: A (Strong Scientific Evidence)	
Therapy	Specific therapeutic Use(s)
Light therapy	Wound healing
Grade: B (Good Scientific Evidence)	
Therapy	Specific therapeutic Use(s)
Colloidal silver	Wound healing
Comfrey	Wound healing
Grade: C (Unclear or Conflicting Scientific Evidence)	
Therapy	Specific therapeutic Use(s)
Activated charcoal	Wound healing
Aloe	Skin ulcers
Alpha-lipoic acid	Wound healing (patients undergoing hyperbaric oxygen therapy)
Arginine	Anal fissures
Aromatherapy	Wound care
Ayurveda	Anal fissure
Beta-glucan	Skin care
Betaine anhydrous	Wound care
Bovine cartilage	Skin care (laser resurfacing adjunct)
Calendula	Anal fissures
Calendula	Skin care



Use a Meta-Search Engine to find evidence sites

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Search

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- DynaMed

- ★ **1. Bar-code technology to reduce medication errors.**
NEJM 2010
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- ★ **2. Computerized bar code-based blood identification systems and near-miss transfusion episodes and transfusion errors.**
Mayo Clinic Proceedings 2013
Share this Add to BMJ portfolio DOI CPD/CME More ▾
- ★ **3. Effect of bar-code technology on the safety of medication administration.**
NEJM 2010
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- ★ **4. Bar-code/eMAR combo reduces errors.**
Healthcare Benchmarks and Quality Improvemen 2010
Share this Add to BMJ portfolio CPD/CME More ▾
- ★ **5. Significant Reduction of Laboratory Specimen Labeling Errors by Implementation of an Electronic Ordering System Paired With a Bar-Code Specimen Labeling Process.**

Refine 341 results by evidence type

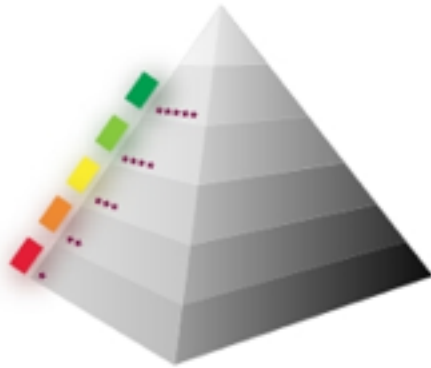
- All Secondary Evidence
 - Evidence-based Synopses 32
 - Systematic Reviews 33
 - Guidelines**
 - Aus & NZ 35
 - Canada 24
 - UK 69
 - USA 26
 - Other 21
- Clinical Q&A 0
- Key Primary Research 8
- Controlled Trials 12
- Extended Primary Research 15
- Case Reports 0
- eTextbooks 66

Further refinements

- For developing world SPECIFIC
- For developing world SENSITIVE
- By clinical area

Accesssss Federated Search O

- <http://plus.mcmaster.ca/ACCESSSSS/>
- Searches simultaneously several evidence-based resources (online evidence-based texts, and pre-appraised journal publications)
- Follows 6s Pyramid of evidence-based decision-making
- Provides email alerts to new published evidence in user's area of interest



6S model explained
Criteria for articles in **PLUS**

Summaries ★★★★★

UpToDate

Treatment of pressure ulcers
Prevention of pressure ulcers
More Results...

DynaMed

Pressure ulcer
Venous ulcer
More Results...



Best Practice

Pressure ulcer
Pressure ulcer > Treatment > Details > Pressure reducing aids + repositioning
More Results...

Syntheses ★★★☆☆

PLUS Syntheses

Pressure Ulcer Risk Assessment and Prevention: Comparative Effectiveness(*Systematic Review*)
Wound cleansing for pressure ulcers.(*Systematic Review*)
More Results...

Studies (pre-appraised by these criteria) ★★★★★

PLUS Studies

Preventing pressure ulcers in long-term care: a cost-effectiveness analysis.(*Original Study*)

Below this bar you must do your own critical appraisal. (and can use these criteria if you wish)

PubMed Clinical Queries

These results are yielded from your search term combined with Search Filters which are a modified version of our PubMed Clinical Queries.

Systematic Reviews

Pressure Ulcer Risk Assessment and Prevention: Comparative Effectiveness [Internet].

Wound cleansing for pressure ulcers

Summaries ★★★★★

UpToDate
DynaMed
Best Practice
StatRef PIER

Synopses of Syntheses ★★★★★

ACP Journal Club (via PLUS)

Syntheses ★★★☆☆

PLUS Syntheses

Synopses of Studies ★★★★★

ACP Journal Club (via PLUS)

Studies ★★★★★

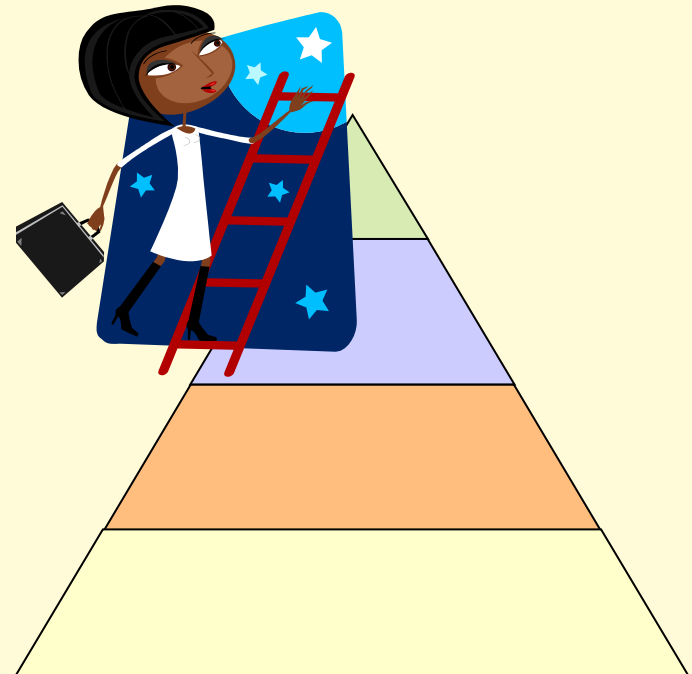
PLUS Studies

Non-Appraised ★★★★★

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Search for Systematic Review and Meta-Analyses Resources

- Cochrane Database of Systematic Reviews **\$HMO**
- PubMed/MEDLINE:
Systematic Reviews **HMO**
- CINAHL **\$HMO**



Systematic review vs. Meta-analysis

- **Systematic review:**
 - a literature review of RCTs focused on a single question which tries to identify, appraise, select and synthesize all high quality research evidence relevant to that question.
 - Uses explicit methods to identify, select and critically evaluate relevant research.
- **Meta-analysis:**
 - a systematic review combining results of several studies using quantitative statistics.



Search

Search Manager

Medical Terms (MeSH)

Browse



Search All Text

medication errors bar cod*

Go

Save

[Add to Search Manager](#)

View search tips (Word variations have been searched)

[Search Limits](#)

Clear

Cochrane Database of Systematic Reviews

All Results (45)

Cochrane Reviews (3)

All

Review

Protocol

Other Reviews (5)

Trials (32)

Methods Studies (0)

Technology Assessments (3)

Economic Evaluations (2)

Cochrane Groups (0)

All

Current Issue

Cochrane Database of Systematic Reviews : Issue 1 of 12, January 2014

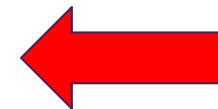
Issue [updated daily](#) throughout month

There are **3** results from **8282** records for your search on 'medication errors in Record Title in Cochrane Reviews'

Sort by Relevance: high to low

[Select all](#) | [Export all](#) | [Export selected](#)

Interventions for reducing **medication errors** in hospitalised adults
Analia S Lopez , Ivan Solà , Agustín Ciapponi and Pierre Durieux
July 2012



Protocol

Interventions for reducing **medication errors** in children in hospital
Aung Soe , Bugewa Apampa , Bernard Fernando , Jolanda M Maaskant , Antje Neubert , Sudhin Thayyil , Hester Vermeulen and Maisoon A Ghaleb
February 2013

Cochrane Database Protocol

To determine the effectiveness of interventions to reduce medication errors in hospitalised adults.

BACKGROUND

Description of the condition

An adverse drug event is an unwanted occurrence after exposure to a drug that is not necessarily caused by the drug. Adverse drug events (ADEs) include adverse drug reactions (ADRs) and preventable adverse drug events, which are adverse drug events associated with a medication error. An adverse drug reaction is defined as any response to a drug which is noxious and unintended. These reactions occur at doses normally used for prophylaxis, diagnosis or therapy of the disease.

Medication errors are broadly defined as any error in the prescribing, dispensing or administration of a drug, irrespective of whether such errors lead to adverse consequences or not (Williams 2007). The Council of Europe (Council of Europe 2005) and the UK Department of Health (Smith 2004) define medication errors as any

preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient or consumer. However, a better definition may be 'the failure to complete a planned action as intended or the use of a wrong plan to achieve an aim'. Errors can include problems in practice, products, procedures, and systems. (Kohn 2000).

The severity of ADEs has been classified as follows (ISMP 2011).

- Category 1: circumstances or processes that have the potential to cause an adverse drug event.
- Category 2: an event occurred but the patient was not harmed.
- Category 3: an event occurred that resulted in the need for increased patient assessments but no change in vital signs and no patient harm.
- Category 4: an event occurred that resulted in the need for treatment and/or intervention and caused temporary patient



Systematic Review

Contents

- Background
- Description of the condition
- Description of the intervention
- Why it is important to do this review
- Objectives
- Methods
- Criteria for considering studies for this review
- Search methods for identification of studies
- Data collection and analysis
- Results
- Description of studies
- Risk of bias in included studies
- Effects of interventions
- Discussion
- Authors' conclusions
- Implications for practice

Abstract

Background

Pressure ulcers (also called pressure sores, bed sores and decubitus ulcers) are areas of tissue damage that occur in the elderly, malnourished or acutely ill, who cannot reposition themselves. Pressure ulcers impose a significant financial burden on health care systems and

Objectives

This systematic review compares cleansing techniques for pressure ulcers.

Search methods

For this review, we searched the Cochrane Central Register of Controlled Trials (CENTRAL; 2012); Ovid MEDLINE; Embase; and EBSCO CINAHL.

Selection

Randomised controlled trials comparing different cleansing techniques for pressure ulcers.

Data collection

Two reviewers independently screened the included studies for continuation of the review. The number of studies included in the review was determined by the Collaborators.

Main results

One additional study was included in the review. Three studies compared cleansing techniques for pressure ulcers. One study compared cleansing techniques for pressure ulcers compared to isotonic saline (P value = 0.025), but no statistically significant change in healing was seen when water was compared with saline (RR 3.00, 95% CI 0.21 to 41.89). One study compared cleansing techniques for pressure ulcers cleansed with pulsatile lavage, compared

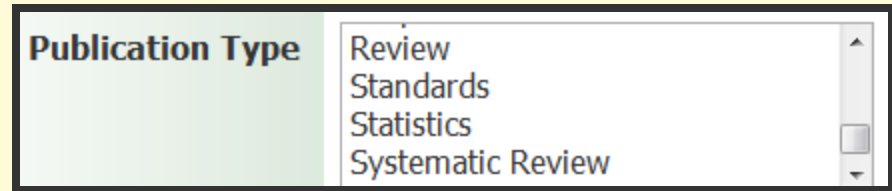
Authors' conclusions

We identified three small studies addressing cleansing of pressure ulcers. One reported a statistically significant improvement in pressure ulcer healing for wounds cleansed with saline spray containing Aloe vera, silver chloride and decyl glucoside (Vulnopur) compared with isotonic saline solution, a further study reported no statistically significant change in healing was seen when wounds were cleaned with water was compared with saline. A final study compared pulsatile lavage with sham and found a significantly greater reduction in ulcer volume at the end of the study period in the lavage group compared with the sham group. The authors conclude that there is no good trial evidence to support use of any particular wound cleansing solution or technique for pressure ulcers.

isotonic saline (P value = 0.025), but no statistically significant change in healing was seen when water was compared with saline (RR 3.00, 95% CI 0.21 to 41.89). One study compared cleansing techniques for pressure ulcers cleansed with pulsatile lavage, compared

Finding Systematic Reviews and Meta-Analyses in *CINAHL*

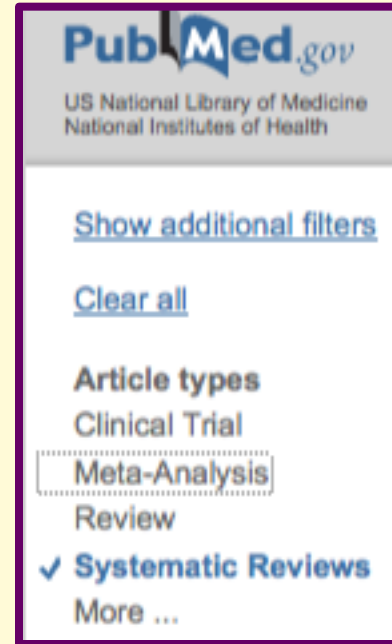
- Use Publication Type Limits:
 - Systematic Review
 - Meta-Analysis



- Search *Meta Analysis* as a Subject Heading

Finding Systematic Reviews and Meta-Analyses in *PubMed*

- Use Article Types filters
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- Use the Clinical Queries section:
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PubMed Clinical Queries

Results of searches on this page are limited to specific clinical research areas. For comprehensive searches, use [PubMed](#)

medication errors/pc [majr] AND (automatic data processing [mesh] OR "bar code" OR "bar codes" OR "bar coding" OR "bar coded

Clinical Study Categories

Category:

Scope:

Results: 5 of 22

Bar-code-assisted medication administration: a method for predicting repackaging resource needs.

Strykowski J, Hadsall R, Sawchyn B, VanSickle S, Nizeick D.

Am J Health Syst Pharm. 2013 Jan 15; 70(2):1

Review article: improving drug safety for anesthesia and surgery.

Orser BA, Hyland S, U D, Sheppard I, Wilson C

Can J Anaesth. 2013 Feb; 60(2):127-35. Epub

Effects of a direct refill program for auto cabinets on medication-refill errors.

Helmons PJ, Dalton AJ, Daniels CE.

Am J Health Syst Pharm. 2012 Oct 1; 69(19):1

Minimizing human error in radiopharmaceutical administration via a bar code-enhanced management system.

Hakala JL, Hung JC, Mosman EA.

J Nucl Med Technol. 2012 Sep; 40(3):183-6. Epub 2012 Jun 5.

Systematic Reviews

Results: 4 of 4

Barcode medication administration work-around: a systematic review and implications for nurse executives.

Voshell B, Biscotti B, Lawrence J, Targosz M.

Young J, Slebodnik M, Sands L. Bar code technology and medication administration error. J Patient Saf. 2010 Jun;6(2):115-20. doi: 10.1097/PTS.0b013e3181de35f7.

Abstract

Medication administration error (MAE) remains a patient safety concern. Few studies have investigated the impact of bar-coded technology on medication error reduction during the medication administration process at the bedside in acute care settings. The purpose and focus of this systematic review is to determine whether implementation of the Bar Code Medication Administration System (BCMA) is associated with declines in MAE rate. Findings from this systematic review reveal varied findings between studies and among the 5 rights of medication administration (right drug, right time, right patient, right dose, and right route) in general. Although BCMA did not consistently decrease the overall incidence of MAE, the technology did identify categories of medication errors not previously detected with the traditional 5 rights approach. The opportunity to analyze the additional categories of MAE identified by BCMA has implications for patient safety and is perhaps the most significant contribution of this review.

Jt Comm J Qual Saf. 2004 Jul; 30(7):355-65.

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- Mandeley – free
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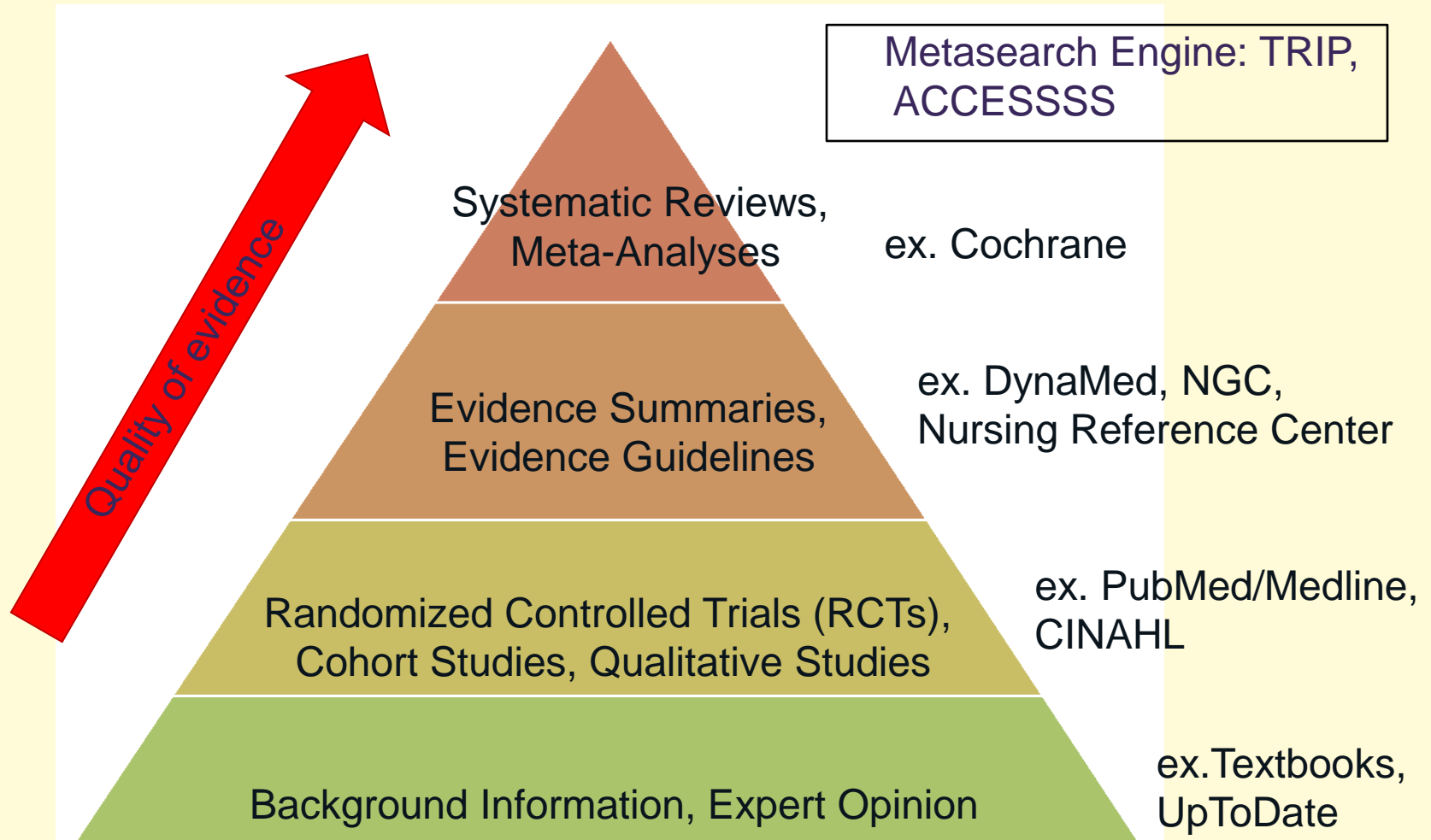
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Evidence Pyramid



Closing Thoughts

- Refer to the handout “Exploring the Evidence Pyramid”
- Remember the **Evidence Pyramid**. Start at the top!
- Use **Cochrane Database** to find SRs.
- Use **DynaMed**, **Nursing Reference Center**, and **Natural Standard** to find summaries of evidence.
- Use **CINAHL** and **PubMed** to find research articles.
- To manage references, use **EndNote Basic**.
- Remember **HEAL-WA** for access to a wide selection of evidence-based eResources.



Exploring the Evidence Pyramid

Handout:

<http://media.hsl.washington.edu/media/schnall/SNRC2014handout.pdf>

PowerPoint:

<http://media.hsl.washington.edu/media/schnall/SNRC2014pp.pdf>

Questions?

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