PowerSearching –

10 steps to effective Literature Searches

Research Champions - C17

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April 28, 2017

Goals

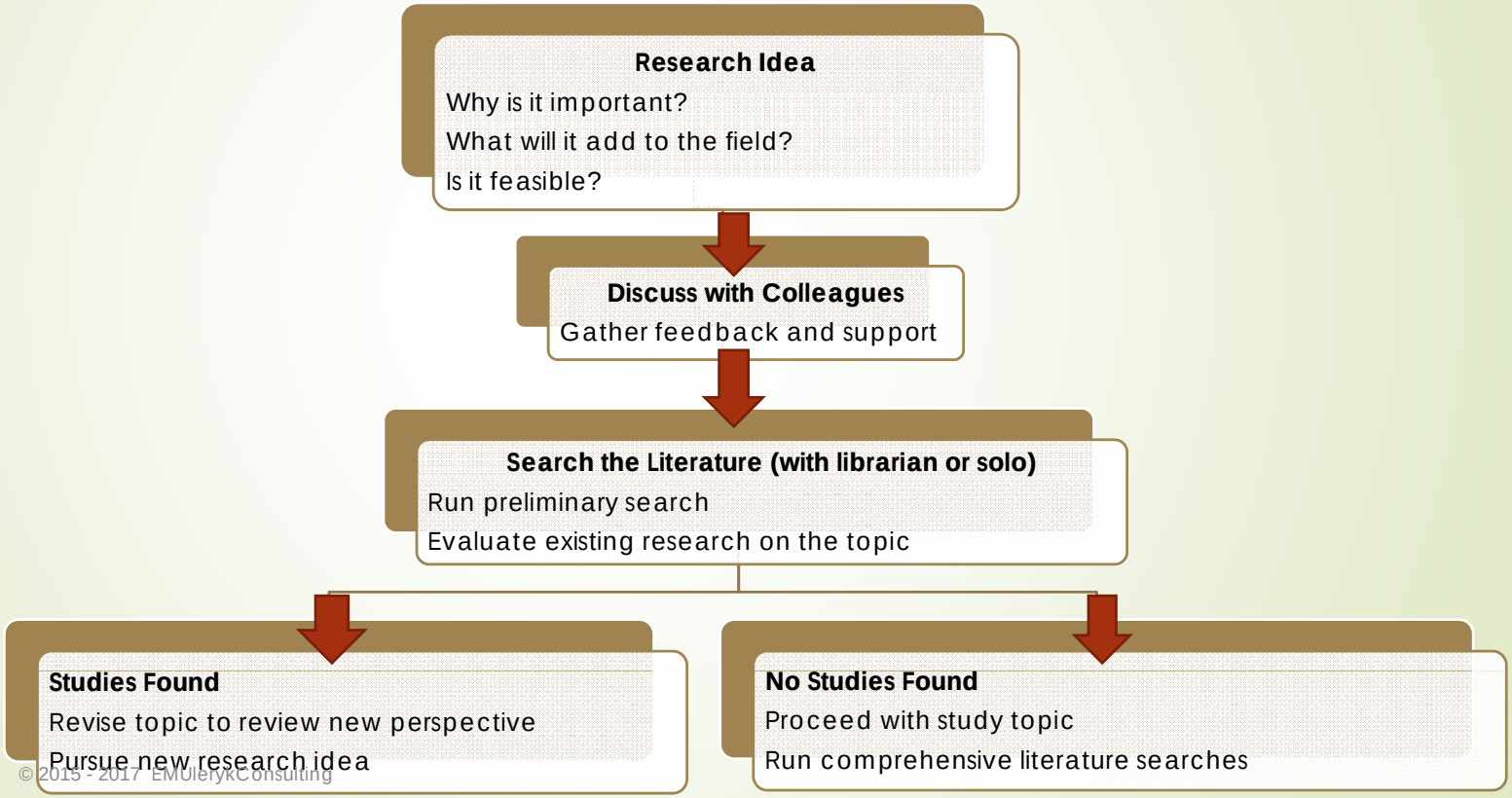
- Increase searching effectiveness and techniques to find the best clinical evidence
- Utilize literature database searching features
- Utilize citation management software to organize search results

Objectives

At the end of this session I will be able to:

- Prepare a PICO or Concept Map of the search question
- List the top 3 databases required for most search topics
- List the difference between subject headings and textwords
- List the 4 pillars of evidence based practice (EBP)
- List 3 study designs or Quality Filters from the EBP pillars
- List 2 reasons for using automatically update your searches
- List 3 reasons for using Citation Management software

Literature Searching Research Timeline



The Sample Question

Research/Clinical scenario

Most if not all children undergoing cancer chemotherapy are more susceptible to infections. I want to know if there are any studies evaluating the prophylactic use of antibiotics to prevent these infections.

The Sample Question – key concepts

Research/Clinical scenario

Most if not all **children** undergoing **cancer** chemotherapy are more susceptible to **infections.** I want to know if there are any studies evaluating the **prophylactic use of antibiotics** to **prevent these infections.**

Step 1 – What is the Research topic

Research Rationale

Why this topic needs to be researched

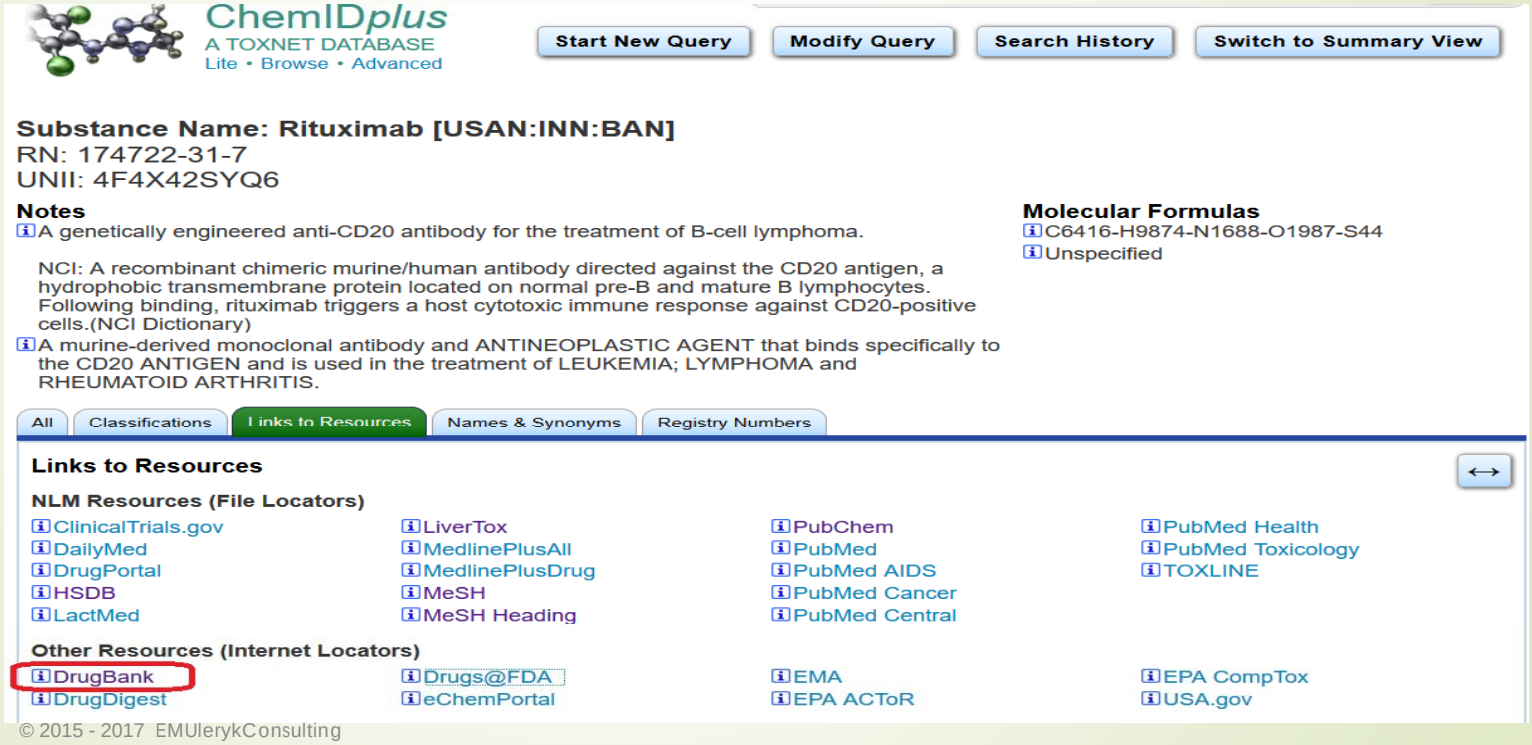
- Clinical scenario – increase/prevalence/adverse events in practice occurrences
- Systematic review project – synthesize the evidence
- Guideline preparation – revise current practice

Step 2 - Background Questions/Research Need

What do I need to know to avoid bias	Where do I search
Existing guidelines on infection control	National Guideline Clearinghouse, MEDLINE, etc.
Institutional practice on infection control	Subject databases (e.g. MEDLINE, etc.)
Systematic reviews/meta-analyses	Cochrane, Subject databases (e.g. MEDLINE, etc.)
Drug safety/interactions	Hospital Formulary, ToxNet and ChemID
Antibiotics vs. other preventive measures	Subject databases (e.g. MEDLINE, etc.)
Supportive care	National Guideline Clearinghouse, Subject databases (e.g. MEDLINE, etc.)

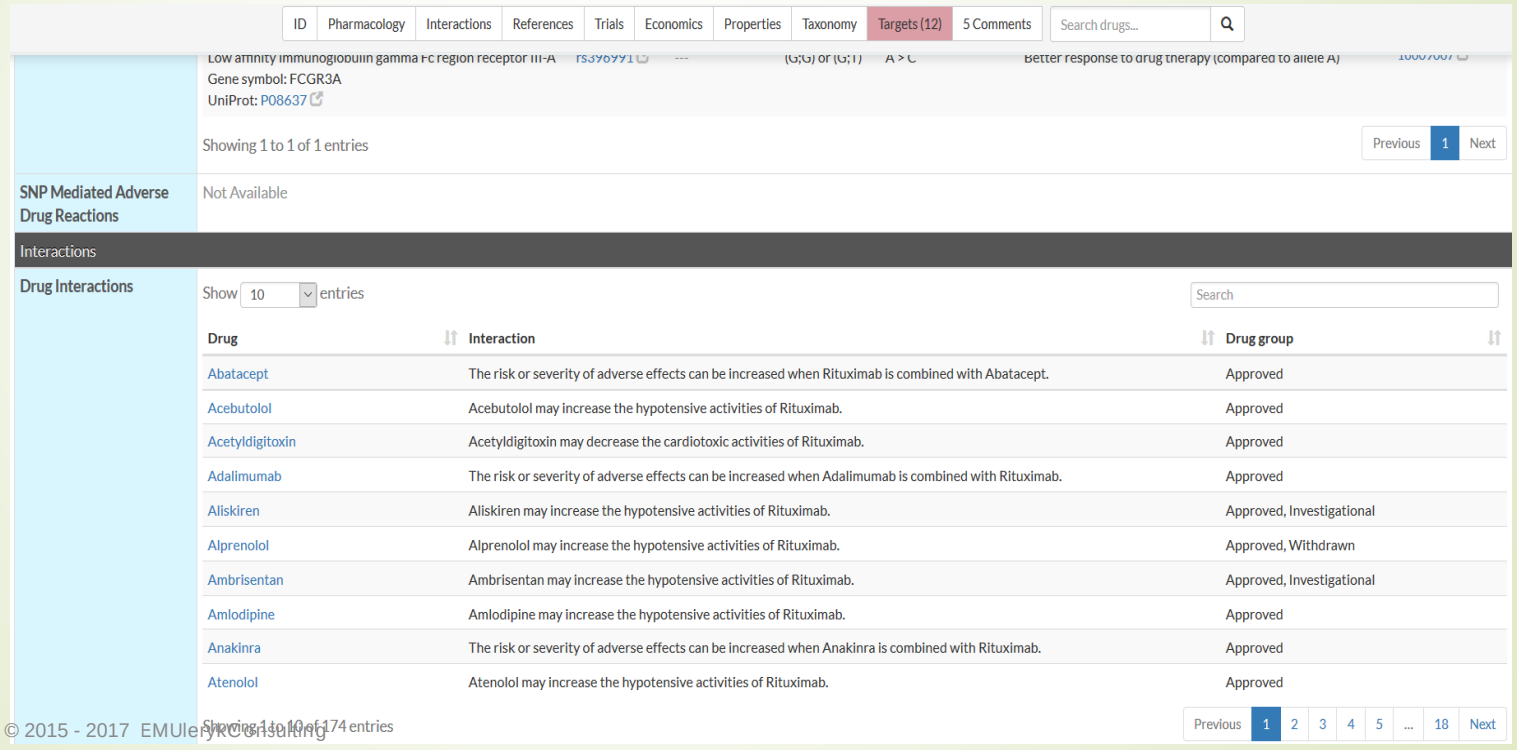
Background Question - Example

ToxNet – ChemID Resource Links – Rituximab (https://chem.nlm.nih.gov/chemidplus/rn/174722-31-7)



Background Question - Example

DrugBank - Health & Welfare Canada (https://www.drugbank.ca/drugs/) - Rituximab



ID | Pharmacology | Interactions | References | Trials | Economics | Properties | Taxonomy | Targets (12) | 5 Comments

Search drugs...

Low affinity immunoglobulin gamma Fc region receptor III-A rs396991 --- (G;G) or (G;T) A > C Better response to drug therapy (compared to allele A) 16079067

Gene symbol: FCGR3A

UniProt: P08637

Showing 1 to 1 of 1 entries

Previous 1 Next

SNP Mediated Adverse Drug Reactions

Not Available

Interactions

Drug Interactions

Show 10 entries

Search

Drug	Interaction	Drug group
Abatacept	The risk or severity of adverse effects can be increased when Rituximab is combined with Abatacept.	Approved
Acebutolol	Acebutolol may increase the hypotensive activities of Rituximab.	Approved
Acetyldigitoxin	Acetyldigitoxin may decrease the cardiotoxic activities of Rituximab.	Approved
Adalimumab	The risk or severity of adverse effects can be increased when Adalimumab is combined with Rituximab.	Approved
Aliskiren	Aliskiren may increase the hypotensive activities of Rituximab.	Approved, Investigational
Alprenolol	Alprenolol may increase the hypotensive activities of Rituximab.	Approved, Withdrawn
Ambrisentan	Ambrisentan may increase the hypotensive activities of Rituximab.	Approved, Investigational
Amlodipine	Amlodipine may increase the hypotensive activities of Rituximab.	Approved
Anakinra	The risk or severity of adverse effects can be increased when Anakinra is combined with Rituximab.	Approved
Atenolol	Atenolol may increase the hypotensive activities of Rituximab.	Approved

Showing 1 to 10 of 174 entries

Previous 1 2 3 4 5 ... 18 Next

Step 3 – translate the research question into a searchable question

Sample methods to determine search terms

- PICOT (Cochrane therapy based)
- Concept Map (Generic search term)
- Spice (evaluate outcomes of a service, project, or intervention)
- SPIDER (structure qualitative research questions with focus study design, and "samples" rather than populations)
- ECLIPSe (investigating the outcomes of a policy or service)

Step 3 – translate the research question into a searchable question

Questions	Yes	No	Why
All types of cancer			
Limit to leukemias, brain tumours, etc			
Bacterial vs. fungal infections			
Include/exclude antibiotics/antifungals or specific ones			
Compare 2 specific drugs			
Compare 2 specific classes of drugs			
Include/exclude HSCT or GVHD			
Include/exclude Catheter infections			
Other			

Step 3 – translate the research question into a searchable question

Questions	Yes	No	Why
All types of cancer	X		Generalize results if possible
Limit to leukemias, brain tumours, etc		X	
Bacterial vs. fungal infections		X	Bacterial only e.g. agranulocytosis
Include/exclude antibiotics/antifungals			Antibiotics only
Compare 2 specific drugs		X	Generalize results
Compare 2 specific classes of drugs		X	Generalize results
Include/exclude HSCT or GVHD		X	
Include/exclude Catheter infections		X	
Other			

Step 3 - PICOT vs. Concept Map/Box

PICOT

- Developed for therapy questions
- Logical and intuitive
- Limited expandability

Concept Map/Box

- Developed for searching all topics
- Logical
- Strong expandability

PICOT analysis

P	**Patient/Problem**	Cancer – children (ages 0 to 18)
I	**Intervention**	Antibiotics
C	**Comparison**	N/A
O	**Outcome**	Bacterial infections - prevention
T	**Time**	Prophylaxis, Chemoprevention
	PowerSearch	Therapy, Prognosis, Risk

Concept Map

	Topic 1	AND	Topic 2	AND	Topic 3	AND	Topic 4
	Cancer	→	Antibiotic prophylaxis	→	Children	→	Therapy Prognosis Risk
	Synonyms/ search terms		Synonyms/ search terms		Synonyms/ search terms		Synonyms/ search terms
O R ↓	All cancer Specific cancer (e.g. Leukemia)	O R ↓	Prophylactic prophylaxis All Antibiotics or specific drugs	O R ↓	Infant Child Adolescent	O R ↓	RCTs Controlled Clinical trials Guidelines

Step 4 – Evidence Based Pillars & Study Designs

- Developed by Cochrane and McMaster University in late 1980's
- Adopted by subject databases as subject indexing terms
- Categorized main clinical practice evidence concerns
- Used to filter search results
  - PubMed clinical queries
  - PubMed search guide for this session pages 34+
  - Cochrane Handbook Section **6.4.11 Search filters** http://handbook.cochrane.org/
  - Institutional library saved searches (e.g. intranet library OvidSP Permanent searches)
  - Institutional library intranet or internet pages for terms (e.g. http://guides.library.ualberta.ca/health-sciences-search-filters/study-type-filters

Evidence-Based Pillars & Study Designs

Diagnosis	Therapy	Prognosis	Etiology
Sensitivity & Specificity (e.g. predictive value of tests" or roc curve)	RCTs CCTs Multicentre studies	cohort studies (e.g. follow-up, retrospective, prospective, observational etc.)	cohort studies (e.g. follow-up, retrospective, prospective, observational etc.)
Diagnostic Errors (e.g. false negatives, false positives)	Clinical Trials (stages 1 to 4)	Prognosis (e.g. mortality, disease-free survival, treatment outcome, treatment failure, medical futility etc.)	Risk terms (e.g. Risk, Risk Factors, Odds Ratio, etc.)
Likelihood functions	Meta-analyses	Morbidity (e.g. incidence, prevalence, etc.)	

Step 5 - Select your search resources – Synthesized/Reference/Background

- Subscription sources
  - Cochrane
  - BMJ Clinical Evidence
  - UpToDate
  - DynaMed Plus
- Open Access sources
  - National Guideline Clearinghouse
  - ToxNet ((**https://toxnet.nlm.nih.gov/**)
  - TRIP (partial subscription service)

Step 5 - Select your search resources

Suggested core Databases – pg 10 PubMed Handout

- **Cochrane Library, 1995- (Wiley http://www.cochrane.org/ or OvidSP)**
- **MEDLINE, 1946- (PubMed, OvidSP, EBSCOHost, ProQuest)**
- **EMBASE, 1947- (OvidSP, Embase.com)**
- **CINAHL, 1983 or CINAHL with full-text, 1946 - (EBSCOHost)**
- **PsycINFO, 1806- (OvidSP, EBSCOHost, ProQuest)**
- **Clinicaltrials.gov 2000- (https://clinicaltrials.gov/)**
- **WHO Global Index Medicus (http://www.globalhealthlibrary.net)**

********Ask your Librarian what other databases are available**

Steps 6 and 7 – Find Search terms

Sample Reference

Field	Data
Author	Inaba H. et al
Title	Feasibility, efficacy, and adverse effects of outpatient antibacterial prophylaxis in children with acute myeloid leukemia.
Abstract	Intensive chemotherapy for pediatric acute myeloid leukemia incurs the risk of infectious complications, but the benefits of antibiotic prophylaxis remain unclear…….
Journal	Cancer 2014 Jul 1;120(13):1985-92
MeSH	Anti-Bacterial Agents/ad/ae/tu *Antibiotic Prophylaxis/ae/me/tr/ut Bacteremia/mi/pc Bacterial Infections Leukemia, Myeloid, Acute/
	Child Child, Preschool ……..

Steps 6 and 7 – Find Search terms

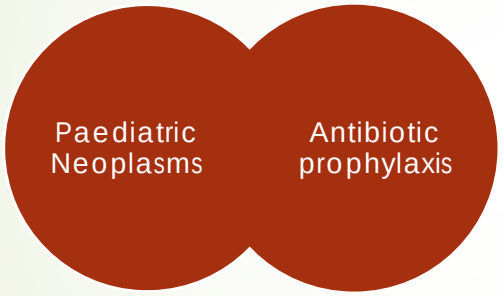
- Use PubMed MeSH database or OvidSP Tools function
  - Provides controlled vocabulary/subject term access
  - Translates synonymous word variations

- Check scope notes for term definition and indexing history
- Check Tree listing for additional terms

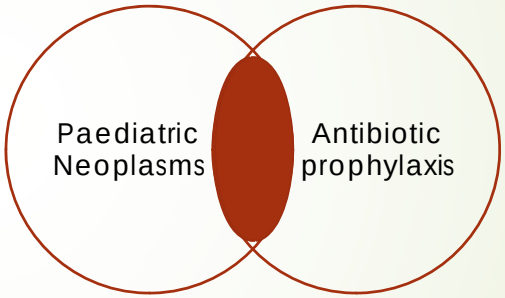
- Add textword terms to cover term indexing history
  - Antibiotic prophylaxis – MeSH term since 1996
  - Find synonymous terms (e.g. prophyla* will search for prophyla(ctic)(ctics)(ctically)(xis), etc.
  - Proximity operators (OvidSP e.g. (antibiotic* adj3 prophyla*).ti,ab,kf.)

- Select terms from each database separately – subject headings are not transferable

Step 8 – Combine search terms- Boolean operators



OR – to expand search



AND – to narrow search

PubMed results

Search	Query	Items found
#14	Search (#13) NOT #10 Filters: Clinical Trial; Child: birth-18 years	61
#13	Search (#3 AND #11) Filters: Clinical Trial; Child: birth-18 years	106
#12	Search (#3 AND #11)	1617
#11	Search "Bacterial Infections/prevention and control"[Mesh]	85274
#10	Search (#5 OR #8) Filters: Clinical Trial; Child: birth-18 years	162
#9	Search (#5 OR #8)	2373
#8	Search (#3 AND #6 AND #7) [****previous indexing****]	1920
#7	Search "Chemoprevention"[Mesh:NoExp] OR prophyla* OR chemoprevent* OR chemoprophyla*	173988
#6	Search ("Anti-Bacterial Agents"[Mesh]) OR "Anti-Bacterial Agents" [Pharmacological Action]	640286
#5	#3 AND #4	857
#4	Search "Antibiotic Prophylaxis"[Mesh] [***available from 1996 +]	11679
#3	Search "Neoplasms"[Mesh]	2904006
#2	Search prophylactic antibiotics in pediatric cancer Filters: Clinical Trial	13
#1	Search prophylactic antibiotics in pediatric cancer	70

PubMed result summary

#2 Search prophylactic antibiotics in pediatric cancer Filters: Clinical Trial – 13 results includes HSCT results

Authors	**Offer K, Kolb M, Jin Z, Bhatia M, Kung AL, George D, Garvin JH, Robinson C, Sosna J, Karamehmet E, Satwani P.**
Title	**Efficacy of tacrolimus/mycophenolate mofetil as acute graft-versus-host disease prophylaxis and the impact of subtherapeutic tacrolimus levels in children after matched sibling donor allogeneic hematopoietic cell transplantation.**
Journal	**Biol Blood Marrow Transplant. 2015 Mar;21(3):496-502. doi: 10.1016/j.bbmt.2014.11.679. Epub 2014 Dec 20. PMID: 25536217**

PubMed result summary

Set 10 -Search (#5 OR #8) Filters: Clinical Trial; Child: birth-18 years - 162 results - combination MeSH, textword, filter and age group results

Author	**Feng X, Ruan Y, He Y, Zhang Y, Wu X, Liu H, Liu X, He L, Li C.**
Title	**Prophylactic first-line antibiotics reduce infectious fever and shorten hospital stay during chemotherapy-induced agranulocytosis in childhood acute myeloid leukemia.**
Journal	**Acta Haematol. 2014;132(1):112-7. doi: 10.1159/000356626. Epub 2014 Feb 12. PMID: 24525963**

PubMed result summary

Set 14 - Search (#13) NOT #10 Filters: Clinical Trial; Child: birth-18 years – 61 results unique outcome results (i.e. bacterial infection prevention and control)

Author	**Kao HF, Chen IC, Hsu C, Chang SY, Chien SF, Chen YC, Hu FC, Yang JC, Cheng AL, Yeh KH.**
Title	**Chlorhexidine for the prevention of bloodstream infection associated with totally implantable venous ports in patients with solid cancers.**
Journal	**Support Care Cancer. 2014 May;22(5):1189-97. doi: 10.1007/s00520-013-2071-5. Epub 2014 Jan 3.** **PMID: 24384684**

Step 9 - Saving and Downloading results

- Download results into your citation management software
- Download and save search strategy to include as Appendix in paper submission
- Save search strategy for automatic updates (alerts)
- Select and save recurring search topic terms to reuse (i.e. permanent saved searches for leukemia terms, etc.)

Step 10 - Staying Current

AutoAlerts	eTOCS
Topic/Project specific	Browsing all journal title content
Updates for topic/project in database title list	Topic specific in one journal
Indexing time delay	Latest including epubs
Full record including database descriptors (e.g. MeSH, EMBASE, PsycINFO)	Brief record
Email delivery	Delivery (e.g. email, RSS feeds, webpage access)
Set up once and manage output	Set-up multiple titles and manage output

Advice from researchers – clear and open your mind

- Schedule time to “Sit and Think”
- Schedule lunch or coffee with colleagues/collaborators
- Read popular literature for trends or advances (e.g. Macleans, Economist, New Yorker, newspapers)

Example: http://www.ctvnews.ca/health/manitoba-scientists-develop-1st-new-antibiotic-in-decades-1.3376016

Citation Management Software

FreeWare

- EndNote Basic http://endnote.com/product-details/basic **(NEW)**
- Mendeley http://www.mendeley.com/
- Zotero https://www.zotero.org/

Commercial

- EndNote http://endnote.com/
- Reference Manager http://refman.com/(discontinued May 2016)
- RefWorks http://www.refworks.com/

Citation Management Software

Functionality varies among products

- Organizes references for research studies
- Generates a data extraction form (e.g. excel format)
- Search inclusion/exclusion notes
- Eliminates majority of incorrect citations
- Direct citation import/export formats
- Finding and linking PDF copies of articles
- CWYW – inserts citations into research papers

Conclusion - Searching Tips

- Use database subject headings first
- Add textwords as required
- Use age group limits as available -consider using textwords for age groups (e.g. infan*, child*, adolescen*) as required
- Use EBP Quality Filters as available/required

Conclusion - Searching Tips

- Consider all languages
- Consider all publication years
- Save frequently searched terms as a Saved searches to minimize searching time
- Select the subject headings for each individual database – no shortcuts

See PubMed handout for examples

Objectives

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Thank-you

Questions

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