# Tools to Develop, Document and Track Systematic Reviews and Meta-Analyses

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- Patricia Dolan Mullen, DrPH
  - For inviting librarians into her systematic review course as co-instructors
- Margaret Anderson Foster, MS, MPH
  - Who began the development of the protocol and the tools in 2005




# Agenda

- Background
  - Librarian's role
- Tools We Have Developed
  - Reporting Guidelines
  - Search Filters
  - RefWorks
  - MS Excel Workbook
- Reporting Methods & Results Template
- Conclusions

## Background

- SR/MA course @ UTSPH since Fall 2003
- Librarian invited to join the course in 2005
- Master's students offered SR/MA as culminating experience option in 2008
- Doctoral students strongly encouraged to complete SR/MA as part of dissertation
- Librarians became "go-to" people
  - Needed some way to organize SRs/MAs of students AND faculty/researchers



## Librarian's Role in SRs/MAs

- Determine if prior SR exists
- Develop search strategies
- Based on reporting guidelines, help track:
  - All citations found
  - Sources used
  - Search terms/strategies used
  - Items included/excluded

# Librarian's Role in SRs/MAs

- Qualifications of the searcher
  - [1]Cochrane Handbook: 6.1.1.1 & 6.3.1:
    - If a CRG is currently without a Trials Search Co-ordinator authors should seek the guidance of a local healthcare librarian or information specialist, where possible one with experience of conducting searches for systematic reviews.
  - [2] Finding What Works in Health Care: Standards for Systematic Reviews (IOM)
    - Chapter 3: 3.1.1 Work with a librarian or other information specialist trained in performing systematic reviews to plan the search strategy
  - [3] Finding Evidence for Comparing Medical Interventions (AHRQ)
    - Key Point: A librarian or other expert searcher should be involved in the development of the search.

[1] http://www.cochrane-handbook.org
[2] http://www.nap.edu/openbook.php?record_id=13059
[3] http://www.effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?productid=605&pageaction=displayproduct



# Tools We Have Developed

- Search filters
  - aka "hedges"
  - http://tinyurl.com/search-filters
- RefWorks
- MS Excel Workbook
  - Designed specifically for SRs/MAs

# Search Filters

- Pre-defined search statements
  - **http://tinyurl.com/search-filters**
  - Study methodologies
    - Search for prior systematic reviews
- Use to determine if SR has been done
  - If so, is it out of date?
  - Review limitations, findings, etc.

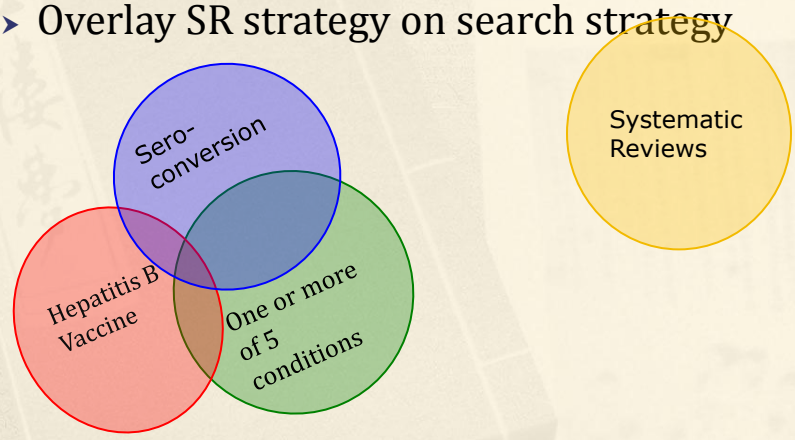


- **Ovid Medline**
  - ((systematic adj3 literature) or systematic review* or meta-analy* or metaanaly* or "research synthesis" or ((information or data) adj3 synthesis) or (data adj2 extract*)).ti,ab. or (cinahl or (cochrane adj3 trial*) or embase or medline or psyclit or (psycinfo not "psycinfo database") or pubmed or scopus or "sociological abstracts" or "web of science").ab. or "cochrane database of systematic reviews".jn. or ((review adj5 (rationale or evidence)).ti,ab. and review.pt.) or meta-analysis as topic/ or Meta-Analysis.pt.
- **Ovid PsycINFO**
  - ((systematic adj3 literature) or systematic review* or meta-analy* or metaanaly* or "research synthesis" or ((information or data) adj3 synthesis) or (data adj2 extract*)).ti,ab,id. or (cinahl or (cochrane adj3 trial*) or embase or medline or psyclit or (psycinfo not "psycinfo database") or pubmed or scopus or "sociological abstracts" or "web of science").ab. or ("systematic review" or "meta analysis").md. or ((review adj5 (rationale or evidence)).ti,ab. and "Literature Review".md.)
- **PubMed**
  - "systematic literature"[tiab] OR "systematic review*"[tiab] OR ("systematic"[ti] AND "review*"[ti]) OR "cochrane database syst rev"[Journal] OR "cochrane database of systematic reviews online"[Journal] OR "research synthesis"[tiab] OR "research integration"[tiab] OR cinahl[tiab] OR embase[tiab] OR medline[tiab] OR psyclit[tiab] OR (psycinfo[tiab] NOT "psycinfo database"[tiab]) OR pubmed[tiab] OR scopus[tiab] OR "web of science"[tiab] OR "data synthesis"[tiab] OR meta-analys*[tiab] OR meta-analyz*[tiab] OR meta-analyt*[tiab] OR metaanalys*[tiab] OR metaanalyz*[tiab] OR metaanalyt*[tiab] OR "meta-analysis as topic"[MeSH] OR Meta-Analysis[ptyp] OR ((review[tiab] AND (rationale[tiab] OR evidence[tiab])) AND review[pt])

**http://tinyurl.com/search-filters**

## Search Filters

- Create search strategy
- Overlay SR strategy on search strategy






## No Prior SR Found? Next Steps….

- Develop searches for each identified database
- Prepare RefWorks
  - Check for duplicate results
  - Screen citations
- Download the MS Excel Workbook
  - Record search information

## Develop searches for each identified database

- Use other search filters when appropriate
  - Other study methodologies available
- Choose a primary db to develop search strategy
  - Create parallel strategies in other dbs



## Reporting Guidelines

- No consensus
- Authors don't always follow existing guidelines
- One SR found 11 reporting instruments
  - Combined total of 18 items to report

Sampson, M., McGowan, J., Tetzlaff, J., Cogo, E., Moher, D. No consensus exists on search reporting methods for systematic reviews. Journal of Clinical Epidemiology. 61(8):748-54, 2008. Available from: http://dx.doi.org/10.1016/j.jclinepi.2007.10.009

## Reporting Guidelines

- Qualifications of the searcher
  - ex: Health sciences librarian experienced in developing SR/MA search strategies….
- Databases used
  - i.e. Medline, PubMed, EMBASE, CINAHL, Sociological Abstracts
- Platform or vendor for electronic databases
  - i.e. Ovid, NLM, Elsevier, Ebsco, CSA/ProQuest



## Reporting Guidelines

- Database update
- Date of search
- Statement of the search ***concepts*** used
- Non-database methods used
  - ex: Bibliographies, handsearching of journals, citation-tracking
- Language restrictions
- Additional inclusion/exclusion criteria
  - ex: study types, populations, geography, settings, start and end dates of search

## Reporting Guidelines

- Statement of any publication status restrictions
  - i.e. published vs. unpublished documents
- Number of items found through database and nondatabase sources
- PRISMA-style flowchart
- MS Word (or similar) document of all electronic search strategies
  - Not a PDF



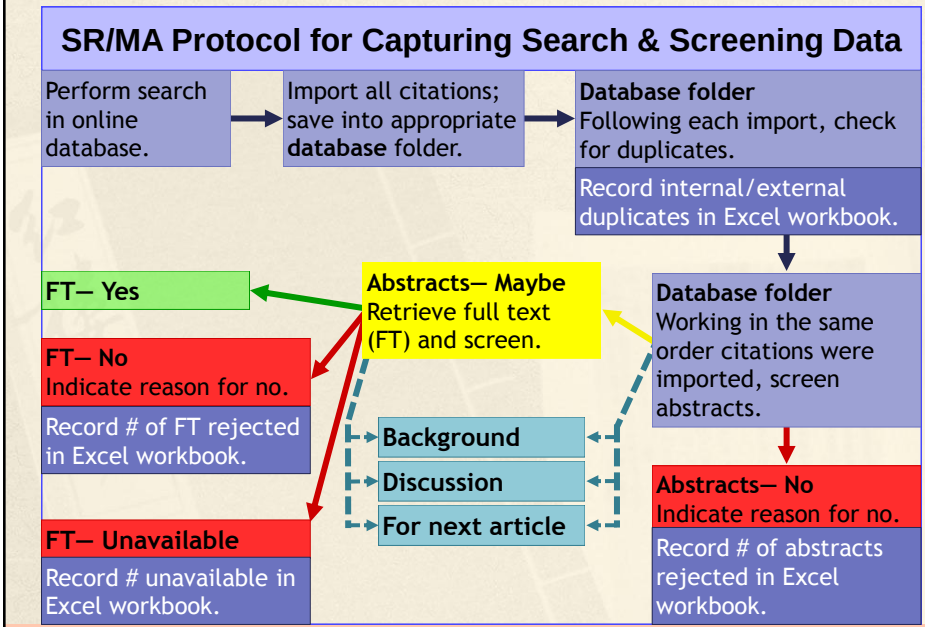
## About the MS Excel Workbook

- Licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License
- 6 worksheets for named databases
- 6 worksheets for other databases
- 5 worksheets for non-database sources
- Summary worksheets for both db items rejected & non-db items rejected
- PRISMA flowchart
  - Populated by data in workbook

# About RefWorks

- Web-based citation management program
  - Can work offline if necessary
- Site license at UTSPH
- Very robust
- Very flexible
- Easy to learn
- Link to article FT within RefWorks
  - Can upload PDFs of articles
- Can create folders





# Prepare the MS Excel Workbook

| | A | B | |
|---|---|---|---|
| 1 | Data Source | **Vendor** | NLM |
| 2 | | **Database** | PubMed |
| 3 | | **Date searched** | 10/3/2011 |
| 4 | | | |
| 5 | Limiters | **English only? (default is "y")** | y |
| 6 | | **Dates:** Use dates of entire database if you did not limit years. | 1989-2012 |
| 7 | | **publications types** | |
| 8 | | **other** | |
| 9 | Results | **Items found** | 732 |
| 10 | | **Internal duplicates (within a single database)** | 0 |
| 11 | | **External duplicates (between databases)** | 0 |
| 12 | | **New** | 732 |

- Vendor & Database filled in on 6 worksheets
- Record date search, range of dates and # of items found



# Prepare the MS Excel Workbook

| | B | C |
|---|---|---|
| | New | 732 |
| 13 | In PubMed, go to | |
| 14 | **Advanced Search** | Nam |
| 15 | to view your search. | |
| 16 | Copy and paste | |
| 17 | your search into | |
| 18 | **Notepad** so you | |
| 19 | can easily remove | |
| 20 | extraneous | |
| 21 | information (time of | |
| 22 | search, # of hits). | |
| 23 | Put tabs between | |
| 24 | the line number and | |
| 25 | text. Copy all. In | |
| 26 | the worksheet, click | |
| 27 | on cell **B15 and** | |
| 28 | **paste**. | |

| | Paste text of search strategy below |
|---|---|
| 1 | (("hepatitis b"[tiab] OR HBV[tiab] OR "viral hepatitis"[tiab]) AND |
| 2 | hepatitis b[mesh:noexp] OR hepatitis b virus[mesh:noexp] |
| 3 | vaccines[mesh:noexp] OR vaccination[mesh:noexp] OR viral hepatitis |
| 4 | #2 AND #3 |
| 5 | hepatitis b vaccines[mesh:noexp] |
| 6 | #1 OR #4 OR #5 |
| 7 | Diabetes Mellitus[mesh] |
| 8 | (diabetes[tiab] OR diabetic[tiab]) |
| 9 | #7 OR #8 |
| 10 | #6 AND #9 |
| 11 | Substance Abuse, Intravenous[mesh:noexp] |
| 12 | Substance-Related Disorders[mesh:noexp] OR Drug Users[mesh:noexp |
| 13 | (needle*[tiab] OR inject*[tiab]) |
| 14 | #12 AND #13 |
| 15 | (intravenous drug users[tiab] OR injection drug users[tiab] OR idus[tiab] |
| 16 | #11 OR #14 OR #15 |
| 17 | #6 AND #16 |
| 18 | HIV Infections[mesh] |
| 19 | HIV[mesh] |
| 20 | (hiv[tiab] OR aids[tiab]) |

- Copy & paste the search strategy below db descriptive elements

## Prepare RefWorks

- Create new account
- Customize
  - Modify # of citations per page
    - 25 → 100
  - Show Option for Global Edit… Yes
    - Add information about interface & database
  - Change User Field Names
    - User 1 Field Name → 1 screening (abst)
    - User 2 Field Name → 2 reason for no (abst)
    - User 3 Field Name → 3 include in SR (FT)
    - User 4 Field Name → 4 reason for no (FT)



## Prepare RefWorks

- Create a folder for each source searched
  - Databases
    - ex: PubMed, Medline, PsycINFO, CINAHL, EMBASE,
  - Non-database sources
    - Bibliographies
    - Citation tracking (Scopus, Web of Science)
    - Handsearching
    - Google (Scholar)
      - Not a traditional db
      - Wouldn't track every item found

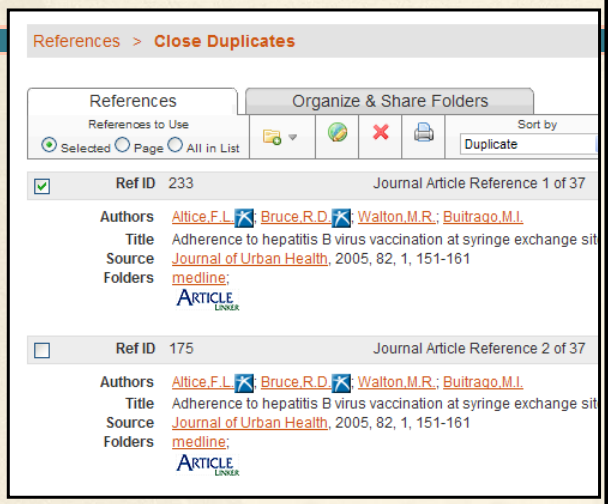
# Prepare RefWorks

- Create screening folders
  - Abstracts – no
  - Abstracts – maybe
  - FT – no
  - FT – yes
  - FT – unavailable
- Create additional folders
  - Background
  - Discussion
  - For next article
    - There's always one paper you fall in love with!

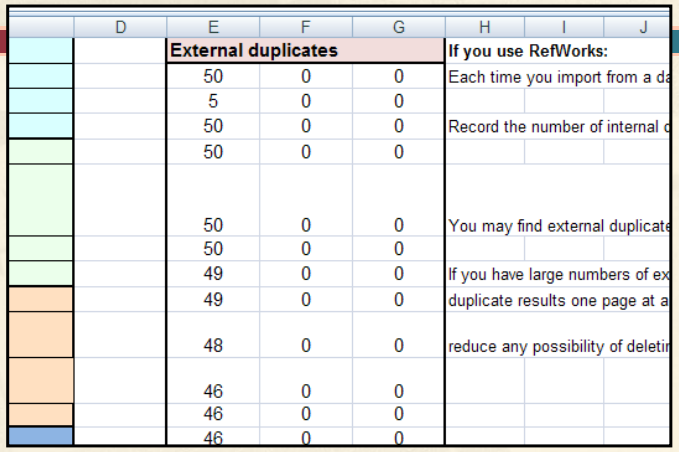


# Import & Check for Duplicates

- Put citations into appropriate database folder
- Manually review RW-identified duplicates
- Delete true duplicates



# Record Duplicates in Excel Workbook



| | D | External duplicates E | F | G | If you use RefWorks: H | I | J |
|---|---|---|---|---|---|---|---|
| | | 50 | 0 | 0 | Each time you import from a da | | |
| | | 5 | 0 | 0 | | | |
| | | 50 | 0 | 0 | Record the number of internal d | | |
| | | 50 | 0 | 0 | | | |
| | | 50 | 0 | 0 | You may find external duplicate | | |
| | | 50 | 0 | 0 | | | |
| | | 49 | 0 | 0 | If you have large numbers of ex | | |
| | | 49 | 0 | 0 | duplicate results one page at a | | |
| | | 48 | 0 | 0 | reduce any possibility of deletir | | |
| | | 46 | 0 | 0 | | | |
| | | 46 | 0 | 0 | | | |
| | | 46 | 0 | 0 | | | |

- To the right of the db descriptive elements
  - 3 columns to track external duplicates



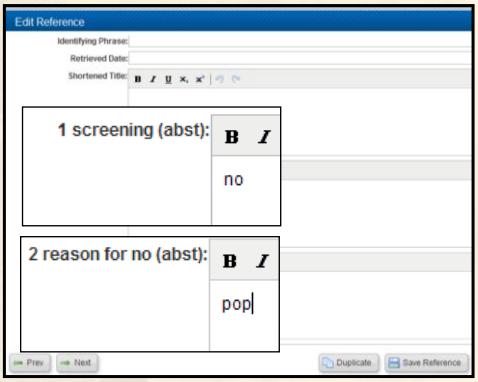
# Record Duplicates in Excel Workbook

| | A | B | C |
|---|---|---|---|
| 1 | Data Source | **Vendor** | NLM |
| 2 | | **Database** | PubMed |
| 3 | | **Date searched** | 10/3/2011 |
| 4 | | | |
| 5 | Limiters | **English only? (default is "y")** | y |
| 6 | | **Dates:** Use dates of entire database if you did not limit years. | 1989-2012 |
| 7 | | **publications types** | |
| 8 | | **other** | |
| 9 | Results | **Items found** | 732 |
| 10 | | **Internal duplicates (within a single database)** | 0 |
| 11 | | **External duplicates (between databases)** | 580 |
| 12 | | **New** | 152 |

- Formula in cell C11 adds all duplicates
- Formula in cell C12 calculates unique items

# Screen Citations/Abstracts

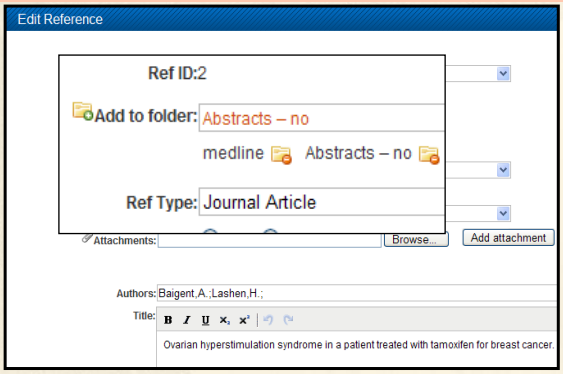
- Each citation/abstract screened for inclusion
  - "no" or "maybe" added to **1 screening (abst)** field
- Reason for no given
  - Short code
    - Ex:
      - pop
      - trmt
      - study
      - geo
      - dis






# Screen Citations/Abstracts

- Save to appropriate screening folder
- After screening all citations/ abstracts, record
  - "reasons for no" and
  - # for each reason in MS Excel Workbook



# Record Abstract "no's" in Excel Workbook

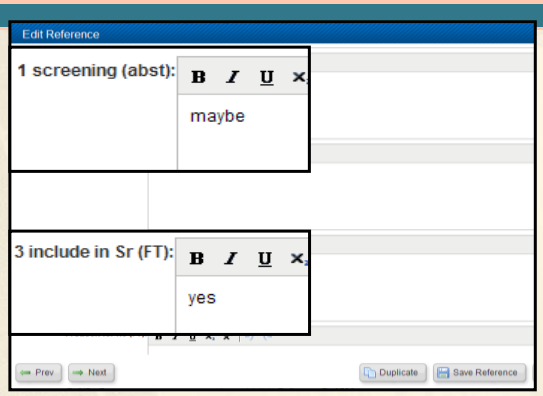
| | A | B | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Complete this worksheet only if you plan to itemize rejections by database. | | Abstracts Rejected | | | | | | | |
| 2 | | | Assign a reason for rejecting articles; values will transfer to flowchart; see below for additional instructions | | | | | | | |
| 3 | Vendor | Database | Not HBV vaccine seroconversion | Wrong publication type | Bench work | Republication of data | Reason #5 | Reason #6 | Total abstracts rejected | # remaining |
| 4 | Ovid | Medline | 397 | 45 | 37 | 8 | 0 | 0 | 487 | 93 |
| 5 | NLM | PubMed | 54 | 13 | 18 | 3 | 0 | 0 | 88 | 64 |
| 15 | Number of abstracts rejected | | Not HBV vaccine seroconversion | Wrong publication type | Bench work | Republication of data | Reason #5 | Reason #6 | Total abstracts rejected | Total # remaining |
| 16 | | | 451 | 58 | 55 | 11 | 0 | 0 | 575 | 157 |

- Choice of 2 worksheets to record "no's"
  - Itemize by database and by reasons for rejection
  - Itemize by reasons for rejection



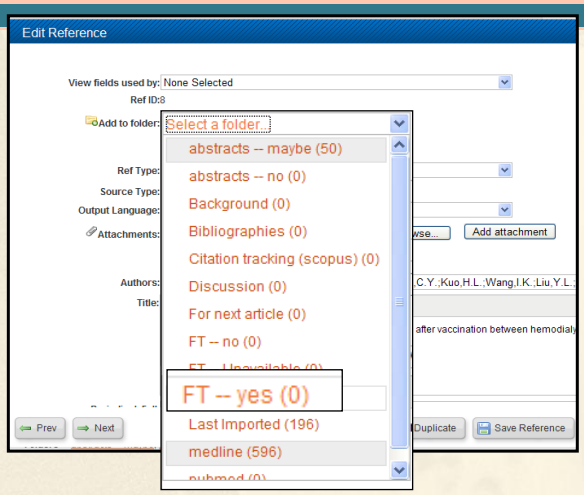
# Screen Full Text

- Retrieve FT of articles in "Abstracts– Maybe"
- Review for eligibility
- 3 include in SR (FT)
  - Enter "no" or "yes"
  - If no, enter reason for no next field



# Screen Full Text

- Save to the appropriate folder
- After screening all FT articles, record
  - "reasons for no" and
  - # for each reason in MS Excel Workbook

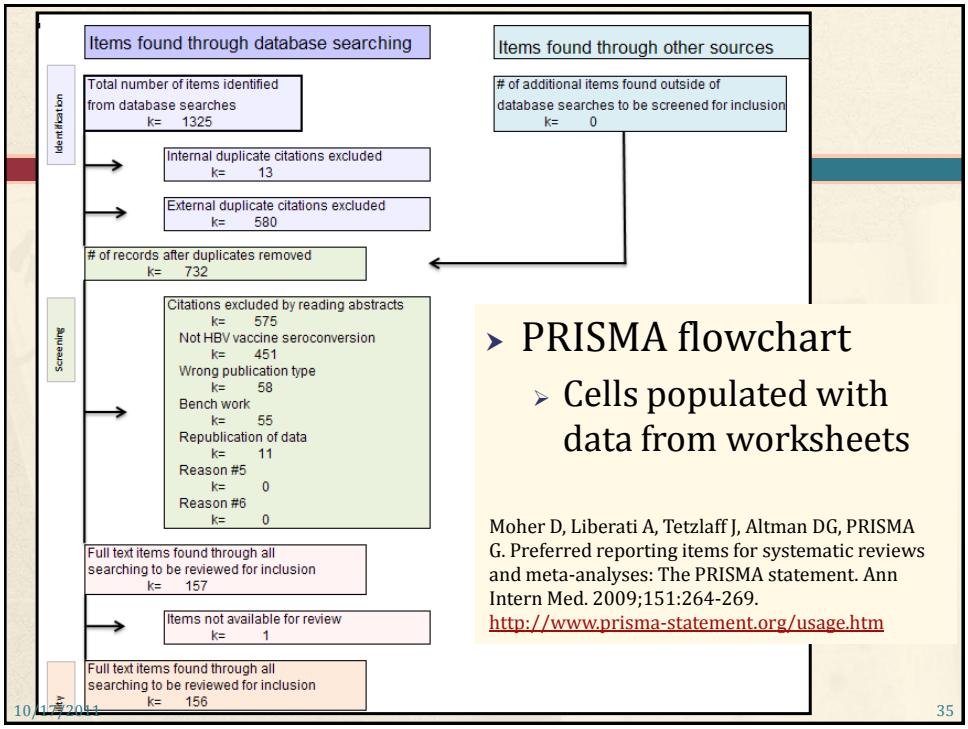





# Record FT "no's" in Workbook

| | L | M | N | O | P | Q | R | S | T | U | V |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Full Text Rejected** | | | | | | | | |
| | | | Assign a reason for rejecting articles; values will transfer to flowchart; see below for additional instructions | | | | | | | | |
| | Number of FT rejected | | vaccine seroconversion | Wrong publication type | Bench work | Republication of data | Reason #5 | Reason #6 | Total full text rejected | # of full text items unavailable | # remaining |
| | | | 32 | 11 | 16 | 6 | 41 | 0 | 106 | 1 | 50 |
| | Additional Instructions | | Use this spreadsheet if you want to record only the total number of items rejected by reason and not by database. Use DB Items rejected by db if you want to record by both reason and database. Don't fill in both this worksheets and DB Items rejected itemized. | | | | | | | | |
| | | | **Be certain the total in Cell T4 matches the number of items in your No-- FT folder in RefWorks.** | | | | | | | | |

- Choice of 2 worksheets to record "no's"
  - Itemize by database and by reasons for rejection
  - Itemize by reasons for rejection




- PRISMA flowchart
  - Cells populated with data from worksheets

Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA G. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. Ann Intern Med. 2009;151:264-269.
http://www.prisma-statement.org/usage.htm



## Reporting Methods & Results Template

With the assistance of a health sciences librarian experienced in developing search strategies for systematic reviews, the following databases were searched: Medline (Ovid; 1948 to September Week 5 2011; & In-Process & Other Non-Indexed Citations October 2 2011; searched October 3, 2011); and PubMed (National Library of Medicine; searched October 3, 2011). Concepts that made up the search were: HBV vaccination, seroconversion, and 5 population with immunoncompromised systems caused by: diabetes, intravenous drug use, HIV/AIDS, hematologic neoplasms, renal failure. Search strategies for each database searched can be found in Appendix A (or online if appropriate). Additionally, bibliographies of relevant articles were examined for studies. Relevant articles were also searched in Scopus (Elsevier) to determine if they were cited by studies that previous searches had not found.

## Reporting Methods & Results Template

Only articles published in English between the dates of 1989 and 2012 were included in the final review. **[the reason why this range of dates was included should have already been explained-- prior review, new drugs, new technology, etc.]** Only research articles from journals were included; comments, editorials, dissertations, conference proceedings, etc. were excluded. All quantitative study types were included. Outcomes measured had to include seroconversion as a result of the HBV vaccine. Participants had to have at least one of the conditions indicated above.



## Reporting Methods & Results Template

Of the 732 unique citations found, I (we) identified 50 studies for inclusion. Of those 50 studies, 37 were randomized clinical trials, 10 were case-control studies, and 3 were cross-sectional studies. Thirty-five studies included participants one condition only; 14 studies included participants with two conditions; 1 study included participants with three conditions. Twenty-two studies employed modified vaccination regimens. Figure 1 [the flowchart] indicates the total number of references that were found through all searches. A table showing the number of items excluded and reason for exclusion [for each database] can be found in Appendix B (or online as appropriate).

# Appendix A: Search strategies

If you publish online as supplemental materials, this should be a Word or text file, not a PDF.

**Appendix A**

Ovid Medline search
In-Process & Other Non-Indexed Citations; 1948 to September Week 5 2011
Searched: 10/3/2011

| | |
|---|---|
| 1 | (("hepatitis b" or HBV or "viral hepatitis") adj3 (vaccin* or immuniz* or immunis*)).ti,ab. |
| 2 | hepatitis b/ or hepatitis b virus/ |
| 3 | vaccines/ or vaccination/ or viral hepatitis vaccines/ or immunization/ or Immunotherapy, Active/ or Vaccines, Attenuated/ or Vaccines, Inactivated/ |
| 4 | 2 and 3 |
| 5 | hepatitis b vaccines/ |
| 6 | 1 or 4 or 5 |
| 7 | exp Diabetes Mellitus/ |
| 8 | (diabetes or diabetic).ti,ab. |
| 9 | 7 or 8 |
| 10 | 6 and 9 |
| 11 | Substance Abuse, Intravenous/ |
| 12 | Substance-Related Disorders/ or Drug Users/ |
| 13 | (needle* or inject*).ti,ab. |
| 14 | 12 and 13 |
| 15 | (intravenous drug users or injection drug users or idus or injecting drug users).ti,ab. |
| 16 | 11 or 14 or 15 |
| 17 | 6 and 16 |



# Conclusion

- Ensures that prior SRs are discovered
- Provides a robust protocol for:
  - Storing;
  - Screening; and
  - Tracking search strategies and search results
- Simplifies the reporting process
  - Citation data for SR/MA is easily accessible
  - Search strategies are readily accessible
  - Enhances collaboration
- Ensures the SR/MA can be replicated in the future

# Thank you

Questions?

Helena.M.VonVille@uth.tmc.edu

Handouts

http://tinyurl.com/SR-handouts

UTHealth | School of Public Health
The University of Texas Health Science Center at Houston

Healthy Communities PROMOTE Healthy Minds & Bodies
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