National Collaborating Centre for Environmental Health

Centre de collaboration nationale en santé environnementale

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Conducting a Literature Search & Evidence Review: The NCCEH Approach

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BC Centre for Disease Control

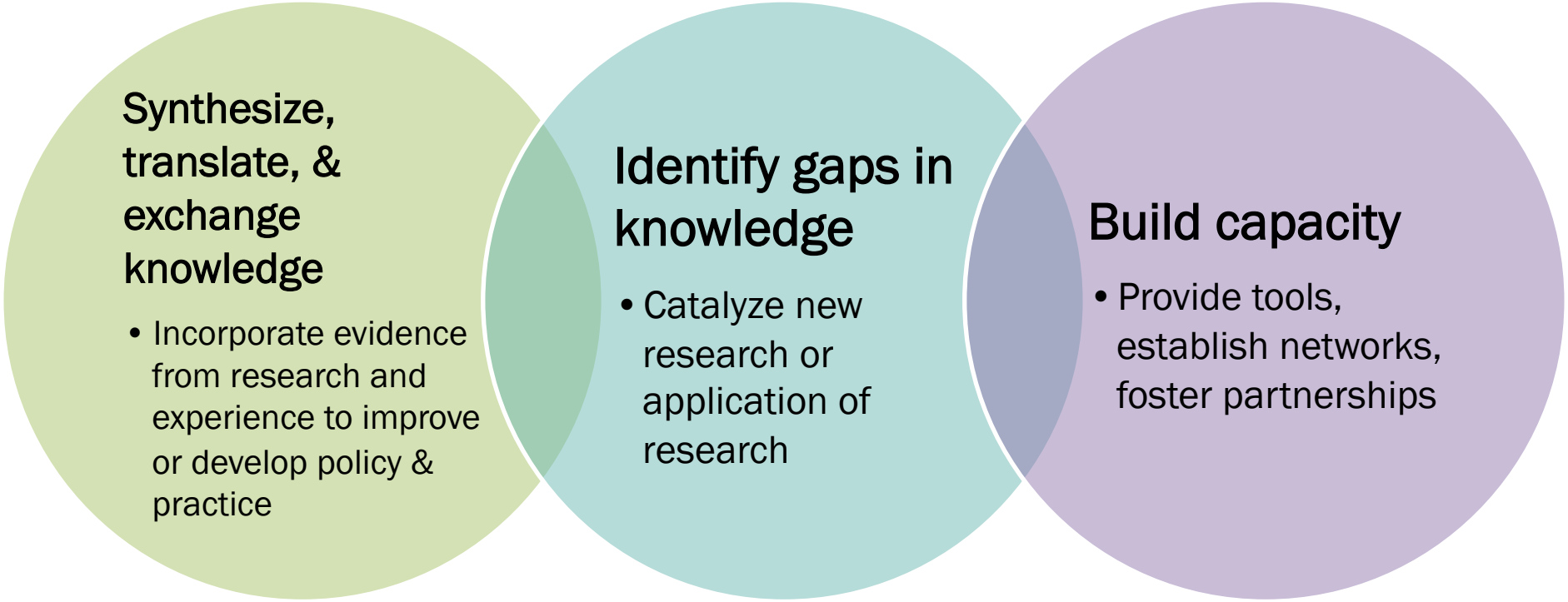
An agency of the Provincial Health Services Authority

Outline

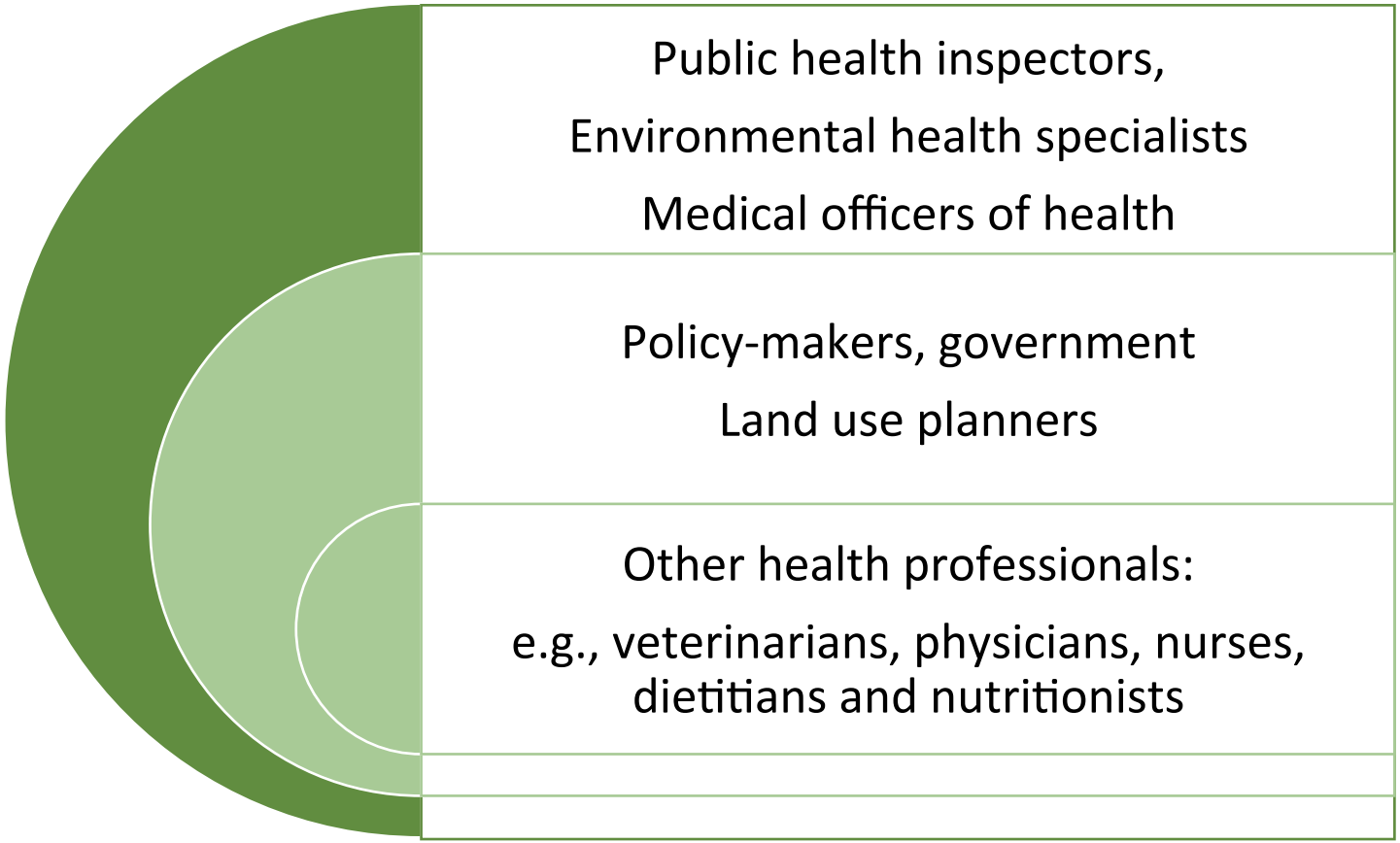
1. Intro to the NCCEH
   - Strategic priorities
   - KT product types
   - Current project highlights
2. What is evidence–informed decision making (EIDM)?
3. Knowledge Translation
   - Case examples
4. Step by step: Literature Reviews

Established by the Public Health Agency of Canada in 2005 to promote the use of knowledge and evidence by public health practitioners and policy-makers in Canada.

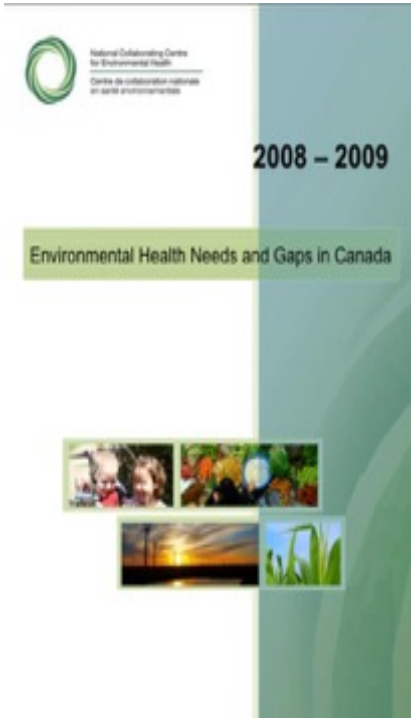
NCCEH's Mandate



Our target audience



Needs, gaps, and opportunities assessment (2005-13)



2012-2013 Environmental Health Needs and Gaps in Canada - Suggested Document Topics

Area	Topic	Percent of Interviewees Rating Topic as High Importance	Total Number of Interviewees Who Rated the Topic
Health impact assessment	Best practices for health impact assessment, for a range of environmental projects (from simple, e.g., harbourside marine waste disposal, to mega-projects, e.g., mining, hydro power, wind turbines). When and to what level.	81	26
Evaluation	How to evaluate EH programs (including overall impact of program vs. different program, priority setting of various programs), e.g., food safety, personal service establishments (e.g., based on burden of disease)	73	26
Oil & gas	Health impacts of shale gas (hydraulic fracturing) at the local level	42	26
Risk assessment & communication	Guide to risk communication with public and media, including where there is no standard or it is exceeded, e.g., old mine site and uranium in drinking water, mould, electromagnetic frequencies (not radon) (focus on gaps in guidance)	42	26
	Understanding and communicating the health relevance of exceeding environmental standards, e.g., drinking water	40	25
	Guide to human health risk assessment, including validation of predictions (e.g., US ATSDR, CDC, EPA) (consider complex chemical mixtures)	36	25
Food safety	Top sources of food-related risks and how to effectively reduce those (including irradiation, buy local food, small operations)	32	25
Enforcement	Comparison of how jurisdictions enforce regulations, including effectiveness (e.g., ticketing, disclosure), e.g., tobacco control (sales to minors, smoke-free environments)	31	26
Risk assessment & communication	How to apply a consistent approach to risk categories for food premises, public pools, personal service establishments	31	26
Drinking water	Regulation of small semi-public water supplies – What are the most effective elements of a regulatory program	27	26
Health impact assessment	How to assess health impacts of official community plans (e.g., water, septic, physical activity) and provide meaningful input	27	26
Housing	Provincial/territorial approaches to housing and health (best practices, including residential, rental)	27	26
Miscellaneous	Effectiveness of use of social media in EH	23	26

Strategic Priorities

Built Environment

Climate Related Environmental Health

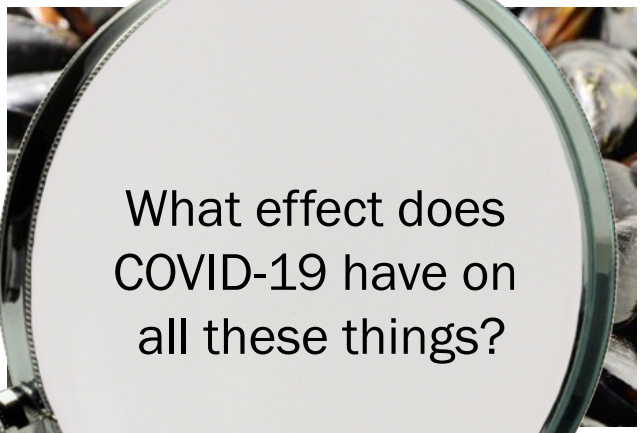
Emergency Response & Enhancing Public Health Capacities

Contaminants & Hazards

Strategic Priorities

Built Environment

Climate Rel… …mental Health



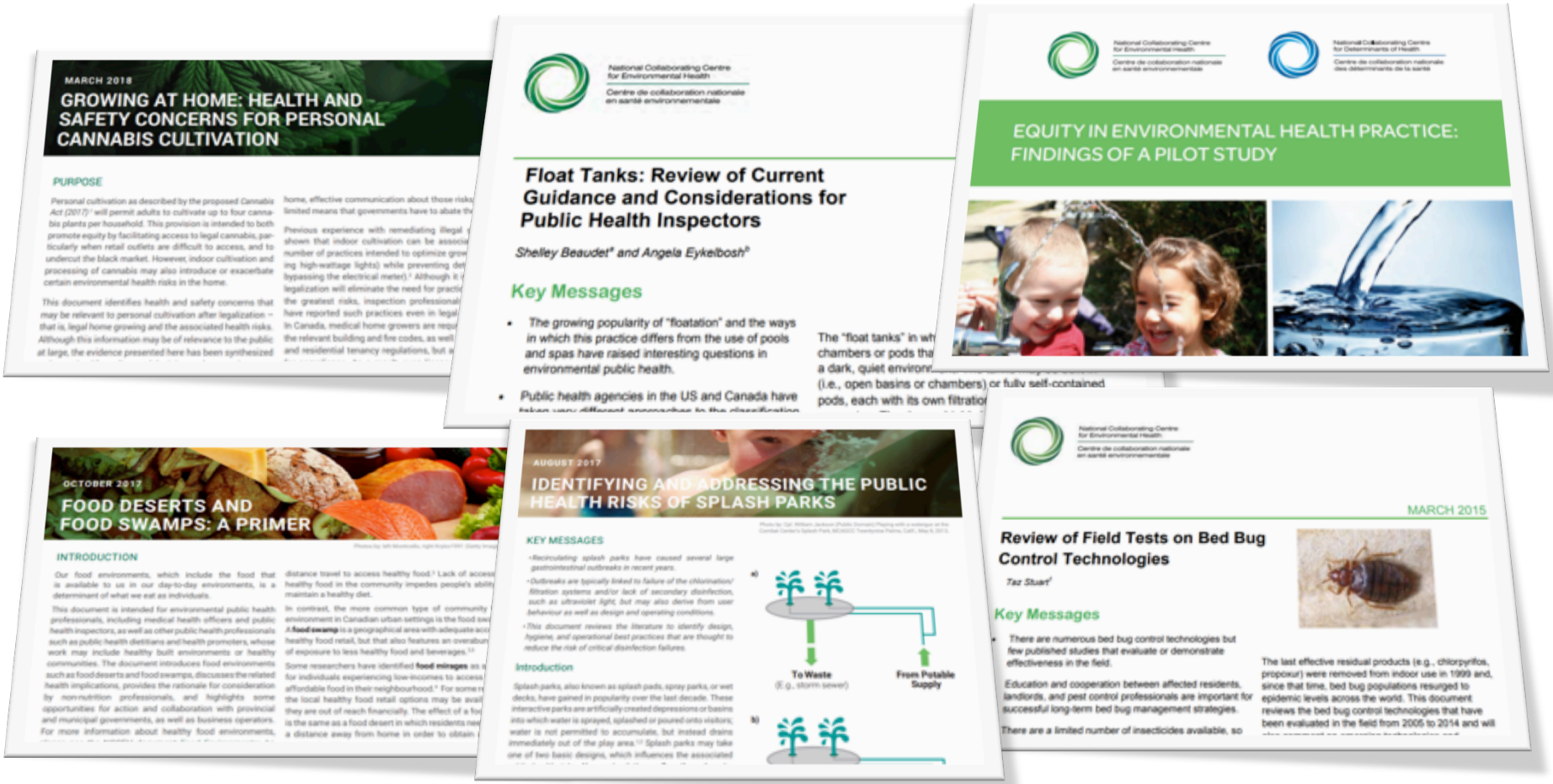
What effect does COVID-19 have on all these things?

Emergency Response & E…
Public Health Capaci…

Conta…

What do we mean by “KT Products?”

Evidence reviews



What do we mean by “KT Products?”

Guidance documents

What do we mean by “KT Products?”

Field Inquiries

Irrigating food crops with water containing cyanobacteria blooms

Primary inquiry: Small horticulture growers have been watering their crops with surface water containing a cyanobacterial bloom, before selling their crops at local markets.

a) Can irrigation of food crops using surface water affected by cyanobacteria blooms result in bioaccumulation of cyanotoxins in these crops?

b) Can cyanotoxins bioaccumulate to a concentration that might cause a public health concern?

Please note: The information provided here is for the purpose of addressing a specific inquiry and is not subjected to external review. The information offered does not supersede federal,

Infection Control for Tebori Tattooing

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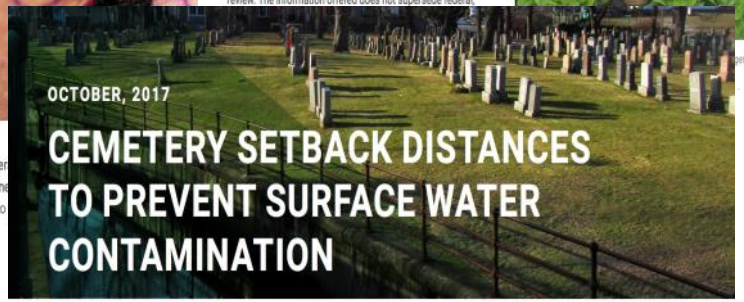


Meat-packing Pads as Tattoo Dressings

Primary inquiry: Is there evidence for or against the use of clean vs. sterile dressings in the care of tattoos?

Disclaimer: The information provided here is for the purpose of addressing a specific inquiry related to an environmental health issue. This is not a comprehensive evidence review and has not been subjected to peer review. The information offered here does not supersede federal, provincial or local guidance or regulations, and/or the advice of a medical professional (where applicable).

Photo credit: acorgirl, Getty Images Plus

Background

During a recent convention on body modification and tattoos in Vancouver, BC, an environmental health officer noticed that tattoo

NCCEH approached the question using the following multi-pronged

Cemetery setback distances to prevent surface water contamination

Primary inquiry: In Canada, as in many other countries, cemeteries are required to be setback a certain distance from waterbodies to protect drinking water sources from contaminated liquids that can arise from the decomposition of bodies after burial. What is recommended as a safe setback distance? What is the rationale for the setback distances used throughout Canada?

Please note: The information provided here is for the purpose of addressing a specific inquiry and is not subjected to external review. The information offered does not supersede federal, provincial, or local guidance or regulations.

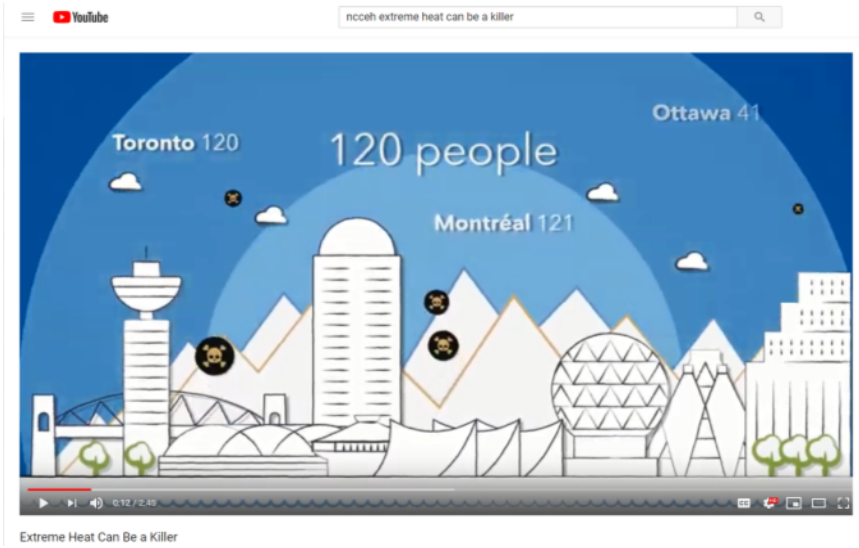
Photo credit: DebraLee Wiseberg Getty Images

What do we mean by “KT Products?”

Topic pages

- *Indigenous disaster response*
- *Floods: Prevention, preparedness, response and recovery*
- *Pesticide exposure in the urban environment*
- *Neonicotinoid pesticides*
- *Cannabis resources for environmental health practitioners*
- *Health equity and environmental public health practice*

Whiteboard animated videos



Extreme heat can be a killer
https://www.youtube.com/watch?v=RBwgS_1D5FM

What do we mean by “KT Products?”

Blogs

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Blog

Cannabis legalization: what can public health do?
Leela Steiner, 2018-10-17
Cannabis, Indoor Air
Given the complexities of the Cannabis Act (2017), public health communities will face a series of...

Cultivation, Consumption, and Complexity - Cannabis...
Leela Steiner, 2018-10-17
Cannabis, Indoor Air
October 17th is an historic day in Canada. This moment offers public health professionals an...

August Newsletter Released: Wildfires
NCCEH, 2018-09-12
The August 2018 newsletter introduces many new resources related to Wildfire Smoke and Disaster...

Personal Service or Medical Procedure?
Shirra Freeman, 2018-09-12
A growing number of personal services present challenges to environmental health practitioners...

Dragon's Breath – Take precautions when using liquid...
Tina Chen, 2018-09-12
A novel food trend has been popping up in shopping malls, carnivals, fairs, and restaurants, using...

The Detection of Oxycodone in Mussels Collected in...
Brandon Yau, BCCDC and Reza Afshari, BCCDC, 2018-08-22
The Washington State Department of Fish and Wildlife in collaboration with The Centre for Urban...

A searchable tool for finding policies on environmental agents, cancer and chronic diseases
Have you ever needed to do a quick policy scan for an environmental health issue or wanted up-to-date information to write a policy brief?
Anne-Marie Nicol, 2018-07-19

Green space can reduce ADHD symptoms in children
Access to green space improves the mental well-being of children and helps with behavior and symptoms of ADHD.
Helen Ward, 2018-06-05

March 2018 NCCEH Research Scan
Each month, our resident super Librarian casts her expert eye across hundreds of journals, news portals, newsletters, and websites to find all the best research articles and grey literature related to
NCCEH, 2018-05-17

Knowledge mobilization and exchange

- Training
  - Online courses
  - Seminar Series
  - EH practicum students
  - Medical students/residents

- Conference presentations
  - CIPHI conferences
  - CPHA
  - Invited talks

- Social media

Monthly eNews

EHO Secondments at NCCEH

2016 Vancouver Coastal Health: **Shelley Beaudet**

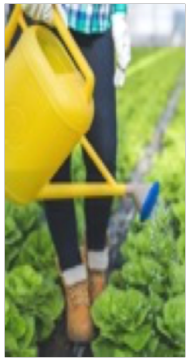
- Float Tanks: Review of Current Guidance and Considerations for Public Health Inspectors
- Float Tanks: Considerations for Environmental Public Health

2017 Interior Health: **Chris Russell**

- Identifying and Addressing the Public Health Risks of Splash Parks
- Food crops irrigated with cyanobacteria-contaminated water: An emerging public health issue in Canada
- Co-facilitated two NCCEH eJournal Club sessions
- CIPIH National AEC presentation

2018 First Nations Health Authority: **Casey Neathway**

- Radon in First Nations communities
- Healthy housing for First Nations
- Traditional/country foods and climate change/ resource development



Evidence-informed decision-making (EIDM)

- EIDM is “the intentional and **systematic** processes of bringing the **best available scientific evidence** on specific questions together with **other relevant information** to help weigh options and **inform decisions** that will affect priorities, policies, programs and practices” (Pierson et al. 2012).

- How to have EIDM in public health?
  - Effective knowledge translation, synthesis, and exchange (KTSE)

Knowledge translation has been described as....

- Activities that foster dissemination, adoption, and appropriation of the most up-to-date knowledge possible to allow for its use in professional practice (INSPQ, 2013)

- Systematic review, assessment, identification, aggregation, and practical application of research by key stakeholders (NCDDR, 2005)

- A dynamic and iterative process that includes synthesis, dissemination, exchange and ethically sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system (CIHR, 2017)

What kind of knowledge does KTSE capture?

- Public Health Knowledge (INSPQ, 2013)
  - Research-based
    - Fundamental/experimental, clinical, or applied
  - Tacit knowledge
    - Know-how of practitioners, researchers, etc. who accumulate knowledge through practical experience
  - Knowledge from data analysis
    - Collected, organized, analyzed and transmitted to stakeholders

KTSE may also be known as:

- Knowledge Transfer (commonly used outside of healthcare)
  - Systematic approach to capture, collect, and share tacit knowledge in order for it to become explicit knowledge
  - Process of getting knowledge used by stakeholders
  - All forms of 'knowing' including research, tacit/experiential knowledge
- Knowledge Exchange
- Research utilization
- Implementation
- Many more… often used interchangeably, but can mean different things

Why care about any of this?

‘Tis not knowing much, but what is useful, that makes a wise man.

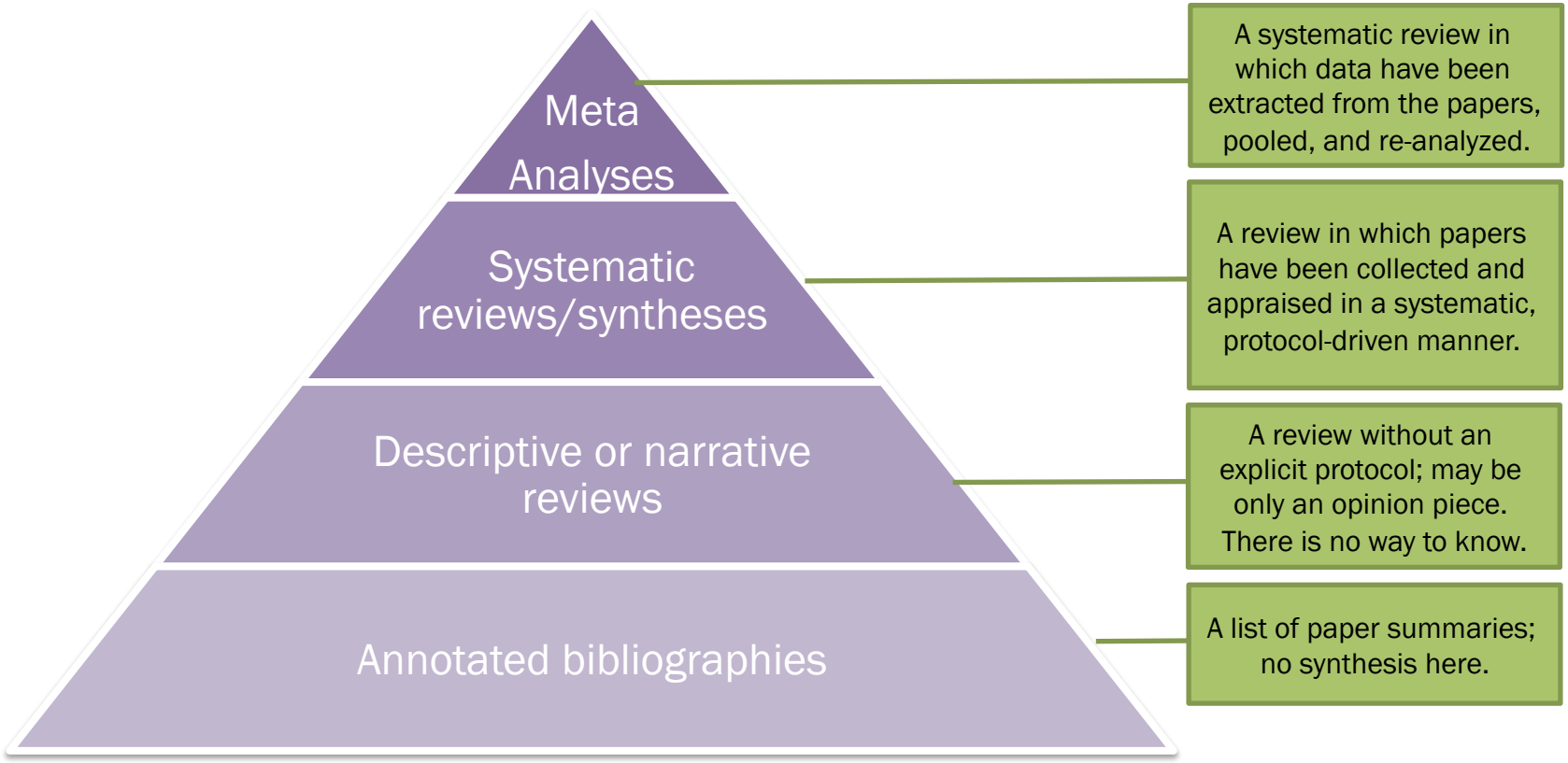
--Thomas Fuller

Where will good KT skills take you?

- Be the best inspector you can be
  - Be an informed, credible communicator with the public
  - Use your own or other research to problem solve
- Be a policy leader in your organization
  - Help develop and implement new ways of doing things (or new ways of dealing with new challenges)
- Share your skills at the provincial or federal level
  - Working groups that identify practice-policy gaps and develop solutions.
  - Permanent positions in policy development and research.
- Work for a KTSE organization like BCCDC or NCCEH

STEP BY STEP: LITERATURE REVIEWS

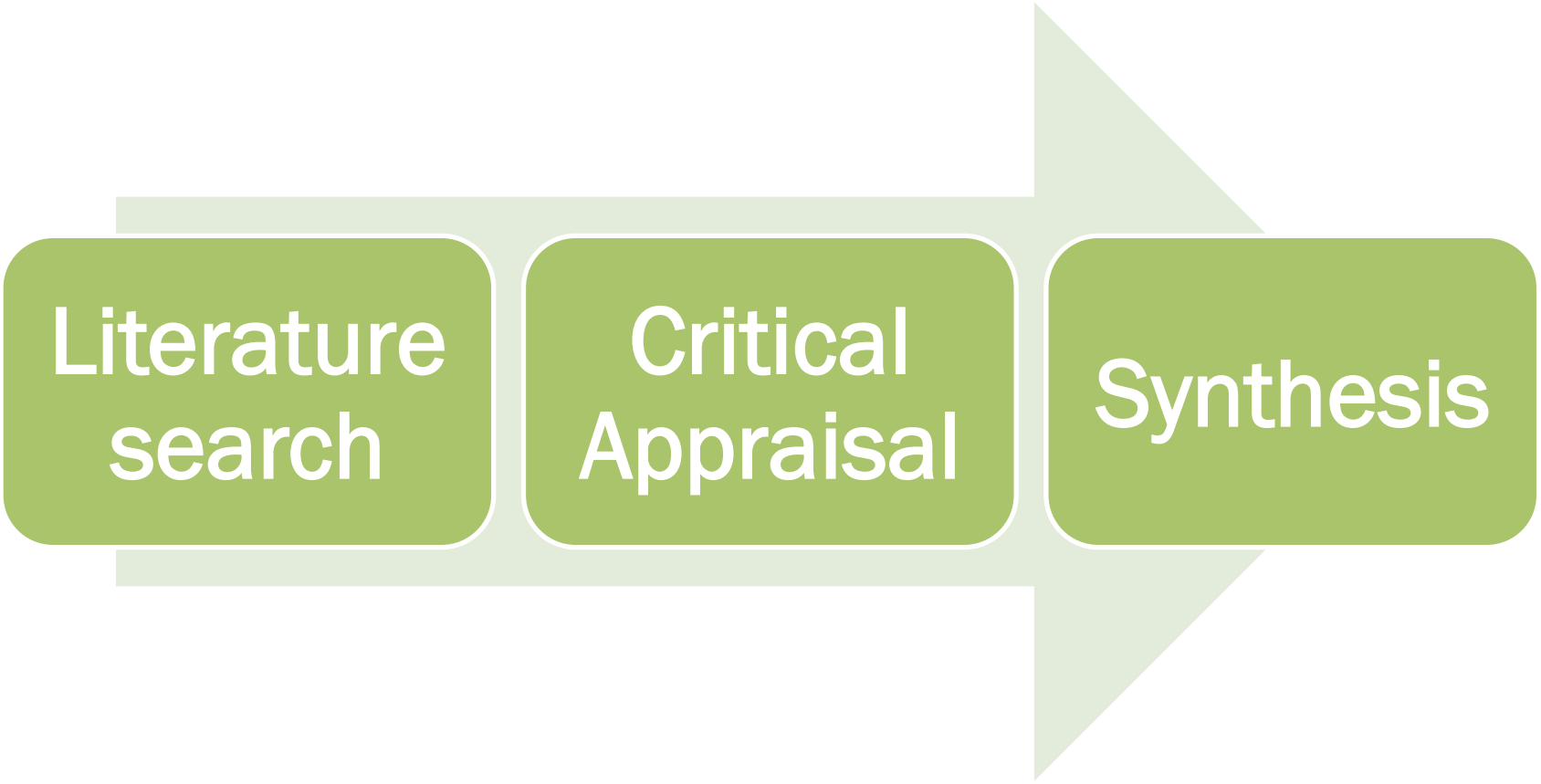
Many types of lit review for <u>different purposes</u>



Knowledge synthesis happens in the three upper levels

What does a literature review involve?

Generally...



Case example:
An inquiry....

An EHO visiting a body art convention noticed that tattoo artists were using meat-packing pads as dressings for new tattoos. The pads are food safe and bacteriostatic, but not sterile. They don't seem to be causing infections. Is it acceptable to let this practice continue?

LITERATURE SEARCH

1. Develop a research question
2. Identify your key words
3. Identify your databases
4. Construct your search query
5. Document your search results
6. Identify the relevant papers
7. Repeat your searches to update

BE CAREFUL!

- Before beginning, take a moment to identify any previously held assumptions regarding the topic.
  - **Bias** in how you shape your question, where you look for information, or what papers you include can invalidate your work.
- Using pre-specified (“*a priori*”) **inclusion and exclusion criteria** adds transparency and rigour to selection of information sources.

Bias in a literature search

- Publication bias:
  - Studies with “positive” results more likely to get published.
  - Helpful to question what types of information might **not** be represented in the literature.
- Database bias:
  - Relying on a single database can systematically limit what you find for certain topic areas.
- Source selection bias:
  - Not just relying on peer-reviewed literature, but also grey literature, theses, etc.
- Paper selection bias:
  - Stick to inclusion/exclusion criteria; have more than one reviewer, if possible.

Step 1: Develop A Research Question

- What question are you going to “ask” the literature?
- Should help you focus your thinking and **narrow down** your lit search.
- BAD examples:
  - What do we know about tattoo infections?
  - Do meat pads give you infections?
  - Do meat pads have bacteria growing on them?

PICO

P	Population (or problem)	Freshly tattooed people
I	Intervention (or exposure)	Used a meat pad
C	Comparison	Instead of a sterile dressing
O	Outcome	Got an infection?

- Is the use of meat-packing pads for tattoo dressing associated with more infections than when using sterile dressings?
  - A specific question, easy to pick out key words.
  - Helps to develop inclusion/exclusion criteria.

Step 2:
Identify Your Key Words

- Brainstorm a list of keywords, including acronyms → *Bandages, dressings, sterile, non-sterile, clean, tattoos, infection.*
- Think of your "**lens**" → keywords from other disciplines, countries, languages, etc.
  - Also called permanent ink; includes permanent makeup.
  - Conventional tattooing vs. traditional tattooing

Step 2: Identify Your Key Words

- More advanced: selecting MeSH terms
- Set your inclusion/exclusion criteria. In this example:
  - Papers about tattoo wounds or similar wounds
  - Papers in which sterile or non-sterile dressings were used intentionally (not accidental contamination)
  - English language only
  - Peer-reviewed, but also grey literature
  - Nothing related to traditional tattooing (different technology)

Step 3:
Identifying Your Databases

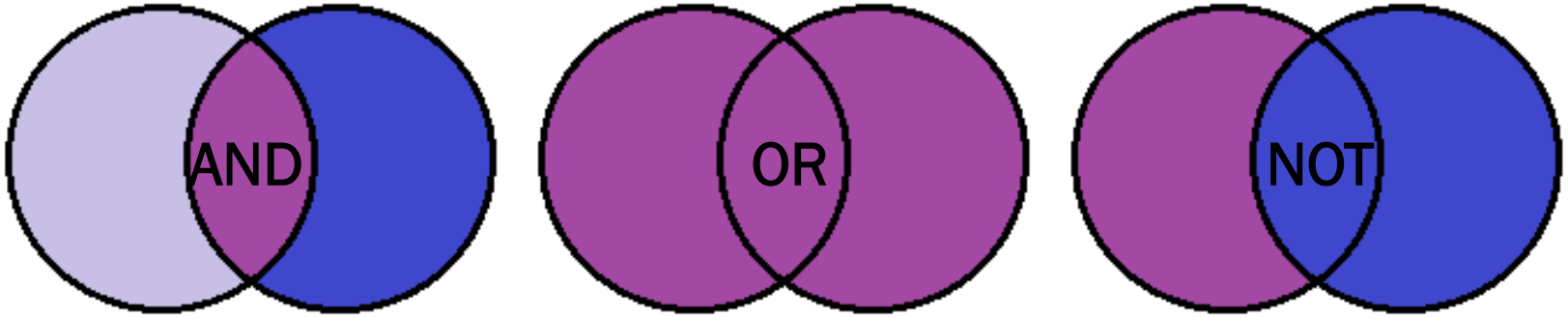
- Google Scholar and PubMed are good places to start, but make sure you also search on other databases. Many great field-specific resources out there!
  - Relying on one database can be a source of bias
  - Libraries provide access to other databases (EBSCOhost, etc.)

Your new best friend:

Ana-Maria Ferrinho, Health Sciences Librarian

Ana-Maria_Ferrinho@bcit.ca

Step 4: Construct Your Search Query



- Boolean operators: AND, OR, NOT, used with (), “”
- Variants:
  - Truncation (*): will add any ending to the root of the word
    - metabol* → metabolizing, metabolism, metabolic, metabolite
  - Wildcard (?): will return different spellings of the word with zero or 1 characters
    - isch?emic → ischemic, ischaemic
- Limiters: time, language, peer-reviewed, paper types, etc.

Step 5: Document Your Search Results

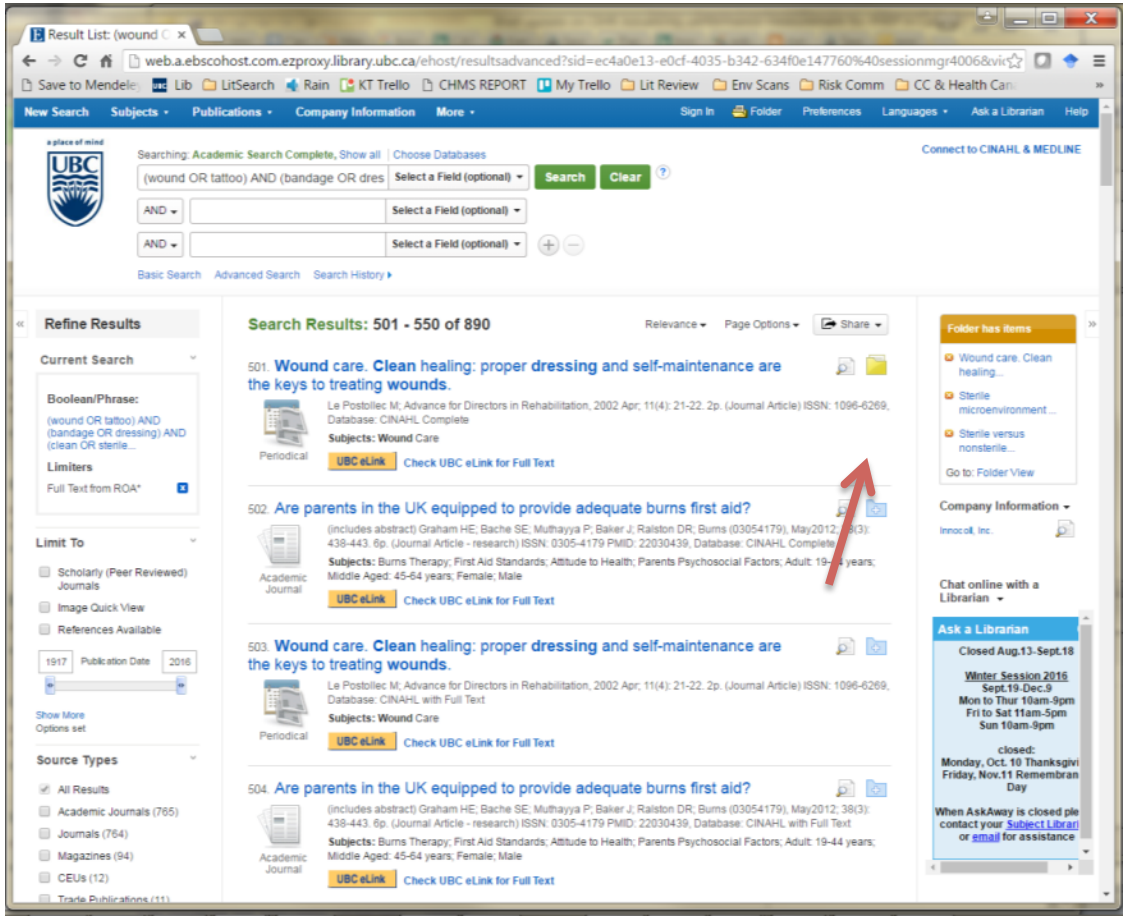
- A lit search is **repeatable** or **replicable.**
- Keep track of what, where, and when you searched:

Date	Database	Key words	Hits
8/22/2016	EbscoHost #1	("post-surgical care" OR "home care") AND (wound OR incision) AND ("sanitary napkins" OR "sanitary pads" OR "maxi-pad" OR "diaper")	0 hits
8/22/2016	EbscoHost #2	(wound OR tattoo) AND (bandage OR dressing) AND (clean OR sterile OR non?sterile)	34 hits
8/23/2016	EbscoHost#3	"tattoos" AND "skin infection"	6,000 hits (Too many hits to review, revise search terms.)
9/1/2016	Google Scholar #1	("post-surgical care" OR "home care") AND (wound OR incision) AND ("sanitary napkins" OR "sanitary pads" OR "maxi-pad" OR "diaper")	1 hit
9/1/2016	Google Scholar #2	(wound OR tattoo) AND (bandage OR dressing) AND (clean OR sterile OR non?sterile)	5 hits
9/1/2016	CINAHL#1	("post-surgical care" OR "home care") AND (wound OR incision) AND ("sanitary napkins" OR "sanitary pads" OR "maxi-pad" OR "diaper")	0 hits

- Very helpful when you need to **repeat** searches

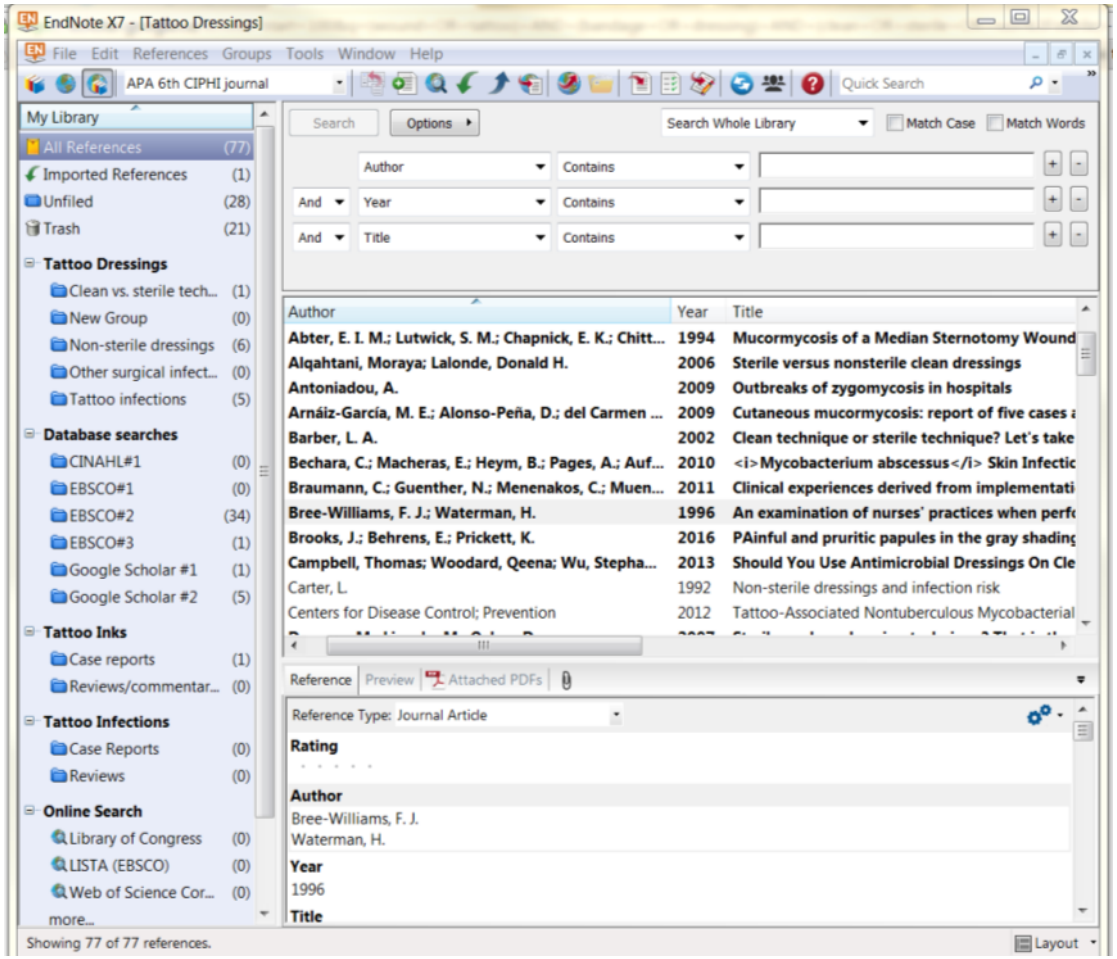
Step 5: Document Your Search Results

- As you run your searches, you need to keep track of the citations of all relevant papers.
- If the title and/abstract looks promising, export the citation to **reference management software.**
- Many database search tools have a selection feature that will allow you to collect and export a batch of papers.



Step 5: Document Your Search Results

- Reference management software is an **essential tool.**
- Records meta-data for all your papers.
- Use **folders** to:
  - Archive your search results
  - Organize papers by topic
- Makes writing easier:
  - Cite as you write
  - Quick bibliography
  - Quick re-formatting



Step 5: Document Your Search Results

- Many **FREE** reference management tools available:

Ref Management Software	Features
Zotero www.zotero.org	• Allows you to import/save citations off Google Scholar and most scientific publication platforms. • Great for organizing, tagging, and making notes on papers. • Has desktop and web-based library. • Facilitates info sharing with other users.
Mendeley www.mendeley.com	
Google Scholar Library https://scholar.google.ca/	• Simplest tool; easy to use, but very limited functionality for a complex search/research question. • Saves references directly out of a Google. Scholar Search (just click the “Save” button) • Can export to other programs, if necessary. • Allows tagging, but can’t sort into folders.

Step 6: Identify the Relevant Papers

- Your search may return 100s of documents
  - Which ones are useful?

- Typically takes two rounds of review:
  - **First Round:** Select papers and import to reference manager based on **title** and then **abstracts** of relevant titles
  - **Second Round:** Read the selected papers and eliminate those which do not fit your **selection criteria**

- As you read, watch out for **additional citations** that may not have appeared in your search

Step 7: Repeat Your Searches

- During and after review, run your searches again periodically until submission for publication
  - Newest publications may have relevant info
  - Note the date range your search encompasses

- Can also use email alerts using your best keywords
  - Google Alerts → good for non-academic content
  - Google Scholar → keyword alerts for academic content
  - Web of Knowledge → citations alerts
  - Many of the publishers have alerts

Common Lit Search Problems

My search returned too many papers to review.	• You may be asking too large of a question. • Refine or limit your research question.
Nothing relates directly to my research question.	• Can anything useful be learned from related fields? Try expanding your search. • Is there any grey literature from public health agencies or other reputable entities?
I can't access the paper online.	• Those with library access may be able to order the article through an interlibrary loan. • No library access? Find partners with access. • Be very careful of relying on Abstracts alone.
The problem is more complex than expected.	• Reach out to the EH community, including other EH practitioners, government agencies, academics, and the NCCEH (contact@ncceh.ca)

CRITICAL APPRAISAL

- Academics and practitioners alike are often asked to appraise evidence for subjects in which they are ***not*** experts.
- This can be challenging (and intimidating), but remember…
  - The process is **iterative**: the more you read, the more you understand, and your understanding of earlier papers in the review will improve.
  - There are a set of **basic questions** you should ask when reading any (and every paper).

Steps to Conducting Critical Appraisal

Step 1: Start at the top

Step 2: Ask the basic questions

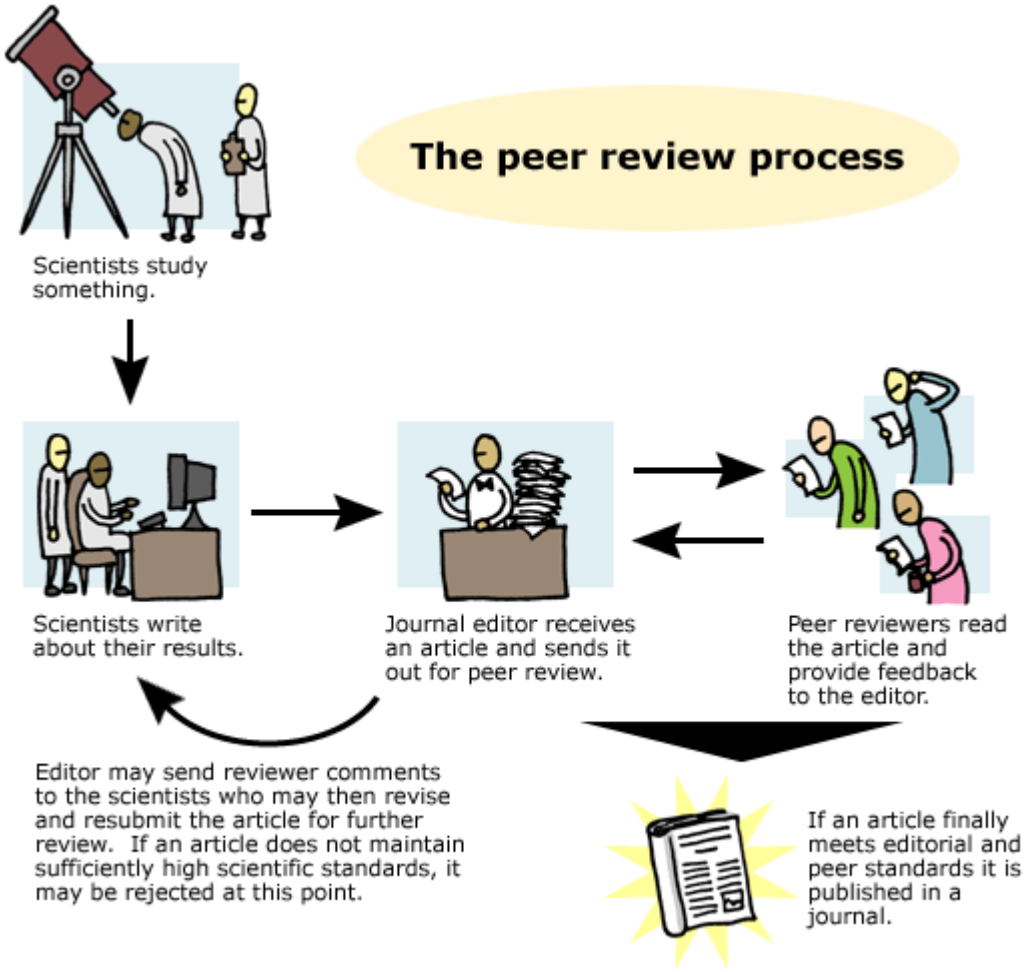
Step 3: Set up your lit review matrix

CRITICAL APPRAISAL
Step 1: Start at the top

- Rather than going directly to primary studies, start with other systematic or semi-systematic reviews
- These resources should have already been appraised through peer review, so they are (more) trustworthy
- At the very least, you know if yet another review is warranted

What is peer review and what does it matter?

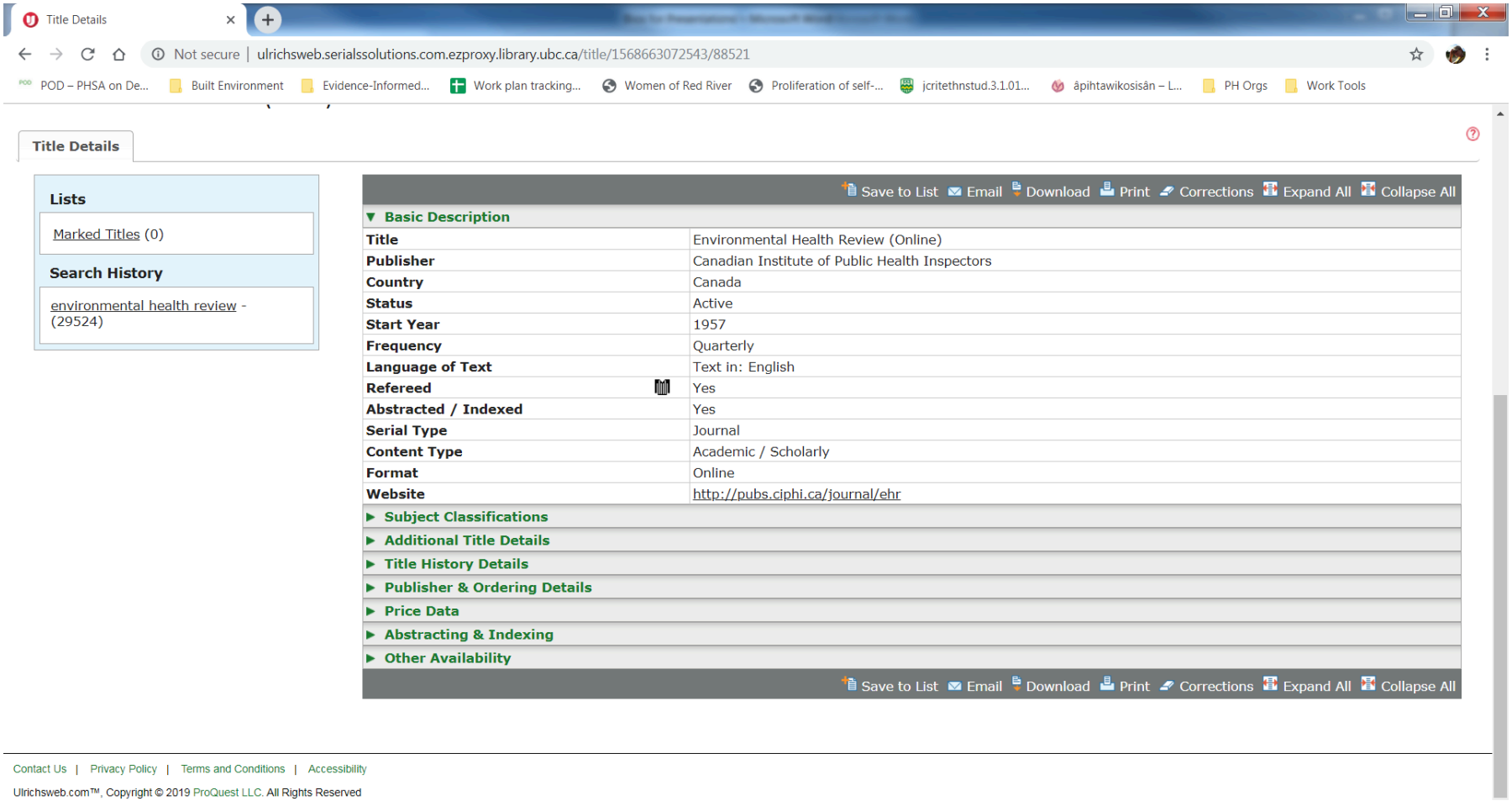
- Reviewed by at least three experts who "grill" the author
- However....
  - Authors suggest their own reviewers
  - Reviewer is anonymous
  - Reviewers are busy
  - Bad stuff gets through.... Wakefield et al. 1998



https://guelphhumber.libguides.com/peer_review

How do I know if a journal is peer-reviewed?

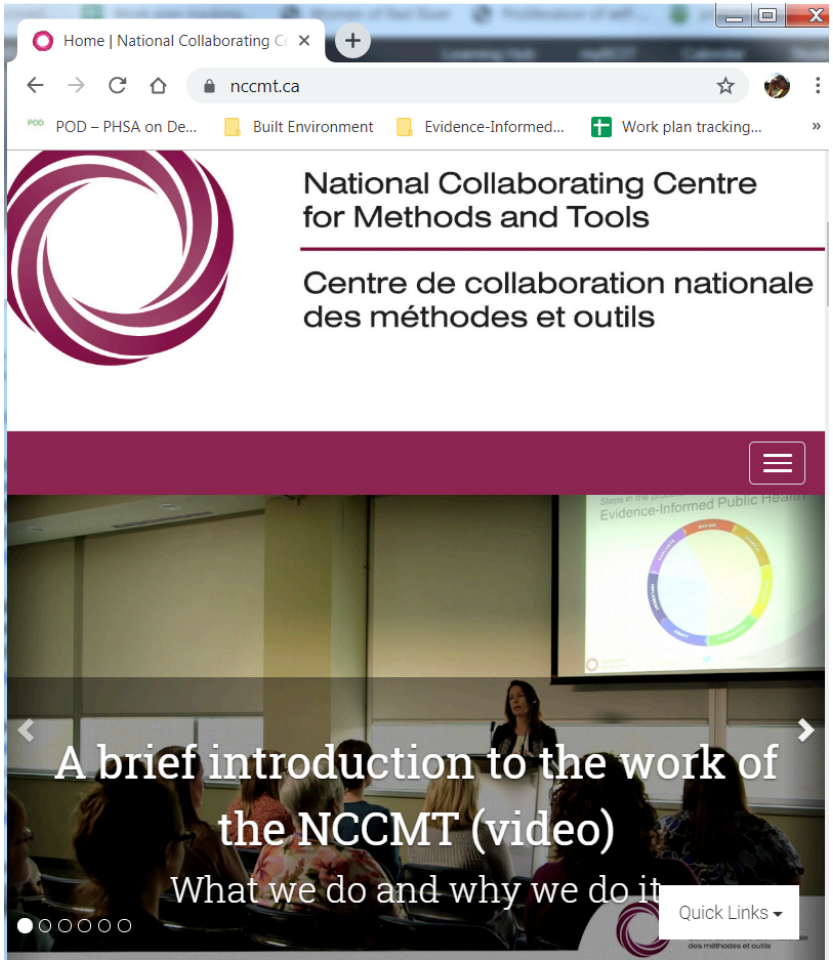
- Library web page, Ulrichsweb, others...



Step 2: Ask the Basic Questions

- For each *individual* study, you should glean the following:
    - What questions does the paper address?
    - What are the main conclusions of the paper?
    - What evidence supports those conclusions?
    - Are the methods appropriate for answering the question?
    - Do the data actually support the conclusions?
    - What is the quality of the evidence?
    - Why are the conclusions important?

Resources for critical appraisal



- NCCEH and NCCMT documents
- “How to Read a Paper” series by Trish Greenhalgh
- Talk with research group or mentor
- Look for obvious conflicts of interest/bias

Step 3: Set up your lit review matrix

- The literature review matrix is a highly useful research tool:
  - Each paper gets a row
  - Each column is an important point of comparison amongst all the papers
  - When the matrix is complete, writing the paper and successfully synthesizing are much easier

- Benefits: organization, accountability, easy to find the gaps, focused RQs; facilitates group work
- During review, scan the references and add any additional relevant papers to the matrix
- For more info: see Klopper 2007, Garrard 2007

Example of a Literature Review Matrix

Study	Setting	Type of wound	Dressings Used	Outcomes
Lawson et al.	Hospital	Contaminated surgical incision	Sterile and non-sterile dressing changes 3 times a day.	No difference in infection rates.
Stott et al.	Hospital	Contaminated surgical incision	Sterile and non-sterile dressing changes 3 times a day.	No difference in wound healing
Karch & Karch	Homecare	Clean surgical incision	Sanitary pads, w/ instruction on clean technique	Serious infection

- Other important points of comparison (columns) may be:
  - Study type, # participants (n), population characteristics, quality rating, comments/criticisms, or any other category important to your research question

SYNTHESIS

- Synthesis means the generation or creation of **new knowledge.**
- Summarizing is **not** synthesizing.
- Your lit review matrix is a **powerful tool** for synthesis.

How do I know that "synthesis" has occurred?

- You have identified and drawn on **relationships** between studies
- You have identified **themes** that stand out from the body of literature
- You have understood the **state of knowledge** within the context of **strengths and limitations**
- You have identified **gaps** in the body of literature
- You have connected your work to **current issues**
- You can suggest further **research** or **policy action**

Key Messages

- Literature reviews are just one tool within KTSE
- A good synthesis can **only** come from a good lit search
- The quality is partly dependent on how well you can avoid bias during the process
- Using a literature review matrix (or synthesis matrix) can help clarify appraisal and facilitate synthesis
- True synthesis has occurred when **new knowledge** or insight on a topic/question has been generated
- A comprehensive synthesis will include public health knowledge from multiple lines of evidence

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More Resources

Canadian Institutes of Health Research. A Guide to Knowledge Synthesis. Available at:

http://www.cihr-irsc.gc.ca/e/41382.html

Harvard Graduate School of Education. The Literature Review: a Research Journey. Available at:

http://guides.library.harvard.edu/c.php?g=310271&p=2071512

National Collaborating Centre for Methods and Tools:

http://www.nccmt.ca/

Virginia Commonwealth University. Write a Literature Review. Available at:

http://guides.library.vcu.edu/lit-review

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