Conducting a Literature Search & Evidence Review: The NCCEH Approach

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Outline

1. Intro to the NCCEH
   • Strategic priorities
   • KT product types
   • Current project highlights
     • Healthy Built Environment
     • Cannabis

2. What is evidence-informed decision making (EIDM)?

3. Knowledge Translation
   • Case examples

4. Step by step: Literature Reviews

5. NCCEH Ron de Burger Student Award
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

Synthesize, translate, & exchange knowledge
- Incorporate evidence from research and experience to improve or develop policy & practice

Identify gaps in knowledge
- Catalyze new research or application of research

Build capacity
- Provide tools, establish networks, foster partnerships
Our target audience

- Public health inspectors,
- Environmental health specialists
- Medical officers of health
- Policy-makers, government
- Land use planners
- Other health professionals:
  - e.g., veterinarians, physicians, nurses, dietitians and nutritionists
Needs, gaps, and opportunities assessment (2005-13)

<table>
<thead>
<tr>
<th>Area</th>
<th>Topic</th>
<th>Percent of Interviewees Rating Topic as High Importance</th>
<th>Total Number of Interviewees Who Rated the Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health impact assessment</td>
<td>Best practices for health impact assessment, for a range of environmental projects (from simple, e.g., harbouride marine waste disposal, to mega-projects, e.g., mining, hydro power, wind turbines), when and to what level.</td>
<td>81</td>
<td>36</td>
</tr>
<tr>
<td>Evaluation</td>
<td>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).</td>
<td>73</td>
<td>26</td>
</tr>
<tr>
<td>Oil &amp; gas</td>
<td>Health impacts of shale gas (hydraulic fracturing) at the local level.</td>
<td>42</td>
<td>26</td>
</tr>
<tr>
<td>Risk assessment &amp; communication</td>
<td>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 (non radon) (focus on gaps in guidance).</td>
<td>42</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Understanding and communicating the health relevance of exceeding environmental standards, e.g., drinking water.</td>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Guide to human health risk assessment, including validation of predictions (e.g., US ATSDR, CDC, EPA) (consider complex chemical mixtures).</td>
<td>36</td>
<td>25</td>
</tr>
<tr>
<td>Food safety</td>
<td>Top sources of food-related risks and how to effectively reduce those (including irradiation, buy local food, small operations).</td>
<td>32</td>
<td>25</td>
</tr>
<tr>
<td>Enforcement</td>
<td>Comparison of how (jurisdictions enforce regulations, including effectiveness (e.g., ticketing, disclosure), e.g., tobacco control (sales to minors, smoke-free environments).</td>
<td>31</td>
<td>26</td>
</tr>
<tr>
<td>Risk assessment &amp; communication</td>
<td>How to apply a consistent approach to risk categories for food premises, public pools, personal service establishments.</td>
<td>31</td>
<td>26</td>
</tr>
<tr>
<td>Drinking water</td>
<td>Regulation of small semi-public water supplies – What are the most effective elements of a regulatory program.</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>Health impact assessment</td>
<td>How to assess health impacts of official community plans (e.g., water, septic, physical activity) and provide meaningful input.</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>Housing</td>
<td>Provincial/territorial approaches to housing and health (best practices, including residential, rental)</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Effectiveness of use of social media in EH.</td>
<td>23</td>
<td>26</td>
</tr>
</tbody>
</table>
Strategic Priorities

Built Environment

Emergency Response & Enhancing Public Health Capacities

Climate Related Environmental Health

Contaminants & Hazards
Select examples of KT products

Evidence reviews
Select examples of KT products

Guidance documents
Select examples of KT products

Field Inquiries

Infection Control for Tebori Tattooing

Meat-packing Pads as Tattoo Dressings

Cemetery setback distances to prevent surface water contamination

Irrigating food crops with water containing cyanobacteria blooms

Primary inquiry: Small scale farmers have been cultivating their crops with surface water containing a cyanobacterial bloom, before selling their produce at local markets.

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

b) Can cyanobacteria accumulate to a concentration that might cause a public health concern?

Disclaimer: The information provided here is for the purposes 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.

Background:

During a recent convention on body modification and tattoos in Vancouver, BC, an environmental health officer noticed that tattoo...
Select examples of 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
Select examples of KT products

Blogs

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
  ![Social media icons]
Successful 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
New KT products coming soon ...

- Cannabis and EH issues: Fact Sheet
- Healthy Build Environment Forum
- Plastics (food contact materials) and microplastics
- Ethnic foods and food safety issues
- Lead in school drinking water sampling protocols
  - Comparison of six agencies in Canada & US
- Whiteboard animated video: ticks and environmental control
Evidence-informed decision-making (EIDM)

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

- How to have EIDM in public health?
  - Effective \textit{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
    • Products include: reports, peer-reviewed publications, lit reviews, systematic reviews, meta-analyses
  – Tacit knowledge
    • Know-how of practitioners, researchers, etc. who accumulated knowledge about theoretical knowledge and 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
Many types of lit review for different purposes

Knowledge synthesis happens in the three upper levels

- **Meta Analyses**
  - A systematic review in which data have been extracted from the papers, pooled, and re-analyzed.

- **Systematic reviews/syntheses**
  - A review in which papers have been collected and appraised in a systematic, protocol-driven manner.

- **Descriptive or narrative reviews**
  - A review without an explicit protocol; may be only an opinion piece. There is no way to know.

- **Annotated bibliographies**
  - A list of paper summaries; no synthesis here.
STEP BY STEP:
LITERATURE REVIEWS
What does a literature review involve?

Generally...

- Literature search
- Critical Appraisal
- Synthesis
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.
- E.g. Include English articles written after 2000; exclude newspaper articles.
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 databases, 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

- Purpose of this is to focus your thinking and your lit search.
- The question should follow the principles of PICOS – population, Intervention (or Exposure), Comparison, Outcome, Setting

Is the use of meat packing pads for tattoo dressing associated with more infections than from 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 selection 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.)
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

- Keep track of what, where, and when you searched:

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

- 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:

<table>
<thead>
<tr>
<th>Ref Management Software</th>
<th>Features</th>
</tr>
</thead>
</table>
| Zotero [www.zotero.org](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](www.mendeley.com) |  • 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.                                                                                                      |
| Google Scholar Library [https://scholar.google.ca/](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, so they are (more) trustworthy
• At the very least, you know if yet another review is warranted
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?
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

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

- 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
How do I know if it’s a “good” paper?

• Appraising the quality of a paper:
  – Apply inclusion/exclusion criteria
  – Many approaches to assessing evidence (e.g., CASP)
  – Consider study design, possible bias, assumptions, plausibility, etc.

• Online resources:
  – NCCEH and NCCMT documents on critical appraisal
  – “How to Read a Paper” series by Trish Greenhalgh
  – Talk about what you mean by “quality” research with your research group or mentor
  – Look for obvious conflicts of interest
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
Ron de Burger Student Award

• Annual award offered in partnership with the Environmental Health Foundation of Canada (EHFC) for students in a Public Health Inspection (PHI) program or a Master’s level public health program

• Intended for students to develop awareness and promote critical analysis of environmental health issues

• Up to five (5) awards are made available annually ($500)

• Winners are also given the opportunity to present to public health practitioners across Canada and write a blog post on the topic chosen
Ron de Burger Student Award

- 2018-19 criteria have changed
- Pre-determined environmental health practice-related scenarios
- Students will provide an evidence-based response based on practice and/or policy implications
- Detailed criteria are forthcoming
References


Little and Parker 2010. How to Read a Scientific Paper. Available at: http://cbc.arizona.edu/classes/bioc568/papers.htm


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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