Interpreting Research Evidence

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My Background

Education

- B.Sc.: *Microbiology and Immunology*
- B.A.: *History*
- M.Sc.(A): *Nursing*

Stress, Coping, Adaptation…

- Ph.D.: *Hospital Epidemiology*

Bias in Lab-Based Surveillance

Work Experience

- Virology Lab
- Nurse/Charge Nurse (Surgery)
- Nursing Staff Development: Surgery and **Infection Control**
- **Memorial University School of Nursing**, NL, Canada (1990-present)

Public Health Agency of Canada, IPAC-Canada, IFIC, WHO

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Overview

You should be able to:

1. Identify sources/types of evidence and their uses;
2. Explain the rationale for critically appraising evidence;
3. Critically appraise key elements of individual studies and a body of evidence;
   - **Criteria for critical appraisal with example**
4. Identify key principles for making evidence-informed recommendations, especially when evidence is limited.

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Use of Evidence

Evidence: That which tends to prove or disprove something; grounds for belief; proof.

https://www.dictionary.com/browse/evidence

- Problem solving: e.g., how have others addressed a problem?
- Develop policies & procedures, guidelines
- Keep current: e.g., journal clubs
  - Raise questions vs. implement

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Sources/Types of Evidence

Type of Evidence	Source(s)
Research (qualitative or quantitative)	**Published studies** Unpublished reports
Indicators	Surveillance, QI
Physical	Lab
Documentary	Documents
Experience	Individuals

Which to use?
Depends on what is available and why you want to look at the evidence

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IF you are using evidence, you need to draw conclusions or make recommendations that are appropriate to the quality of the evidence
… so critically appraise it

Before critical appraisal, you need to:

1) Recognize the need for evidence:
   - Have an inquiring mind
2) Find the evidence

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Finding Literature

- Talk to a librarian or others about searching
- Evaluate relevance of what you find (studies and sources) and change search as necessary
- Do your own searches when possible

- Can do a free PubMed search then request as necessary; many articles are free
- Screen abstracts, choose what seems relevant, then rescreen by reading article

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Critical Appraisal = ?

Assess a study or body of evidence against pre-set criteria: were they met or not met?

- **Should you believe the results?**
  - ***Did x really lead to y or were alternate explanations possible?***
    - E.g., Low carb diet led to weight loss, education session led to reduced occurrence of infections

Are the results applicable to your setting/group?

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Critical Appraisal

Assess study or body of evidence against pre-set criteria: were they met or not?

1. Where do I find criteria? — Texts, tool kits
2. What are the criteria? — Vary in number and detail, but many commonalities: focus on study's internal validity
3. How do I apply them?
   - Systematically

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Use a Tool Kit!

- Many sources of criteria for appraisal
  - General and design-specific tools
  - Different designs are susceptible to different threats so don't need same criteria for all designs (though many are similar)

Advantages:
- Similar criteria being assessed in the same way so more consistency in appraisal
- Common language for discussion
  - "High" or "low" quality will have same meaning

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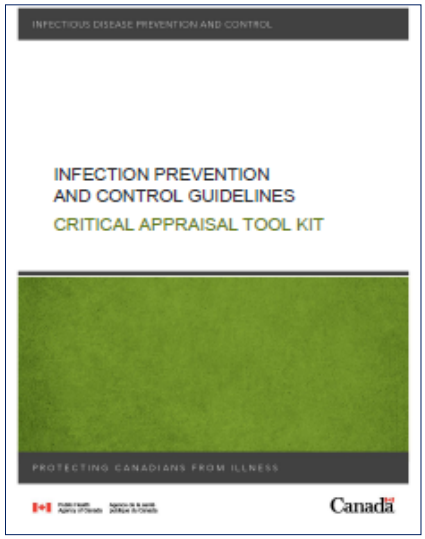
One Tool Kit to Help...

- One of many for quantitative research
- Readily available
- If familiar with it, have basis for assessing others
- http://publications.gc.ca/collections/collection_2014/aspc-phac/HP40-119-2014-eng.pdf



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PHAC Critical Appraisal Tool Kit

Individual Studies	Support Tools for Appraising Individual Articles	Support Tools for Appraising a Body of Evidence
2 Critical Appraisal Tools, each with a Dictionary: • Analytic Studies • Descriptive Studies	• Naming Study Designs Algorithms • Table: Summary of Designs • Table: Summary of Common Stats • Glossary	• Literature Review CAT • Guidelines for Evidence Summary Table • Grading system

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Steps to Critical Appraisal

1. Name the study design
   - Choose the appropriate critical appraisal tool
2. Appraise the quality of the study
   - Draw a conclusion about the study
3. Summarize the overall body of evidence
   - Draw a conclusion about all the studies together
4. Make recommendations

Will go through key criteria then illustrate with an example

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First Step: Name Study Design

- Naming the study design helps you:
  - Identify which tool to use
  - Identify which criteria need emphasis
  - Which studies to focus on
    - If multiple studies, focus on strongest designs as they have best control of extraneous factors/best evidence
- Tool Kit has algorithms and a summary table of key aspects to help name most common designs

Naming design frequently needs discussion, for both novices and experts!

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Descriptive Studies

Describe occurrence or an association

- Cross-sectional
- Ecologic
- Case Reports

Qualitative Research:
- Descriptive, interviews/focus groups
- Themes/words not numbers

Analytic Studies

Test association

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Descriptive Studies

Describe occurrence or an association

- Cross-sectional
- Ecologic
- Case Reports

Quasi-experimental is a category, not a design

Analytic Studies

Test association

- Intervention Studies
  - RCT or NRCT
  - Controlled before-after
  - Interrupted time series
  - Uncontrolled before-after
- Observational
  - Cohort
  - Case Control

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Different Designs

Design	Control group?	Allocation to group	Researcher controls intervention	What is done
RCT	Yes	Random	Yes	R O X O O O
Non RCT	Yes	Nonrandom	Yes	O X O O O
Uncontrolled before-after	No	N/A	Yes	O X O
Cohort	Yes	Natural	No	N O exp O O O
Case-control	Cases Controls	Identified as having outcome or not, then look back to see if had (natural) exposure		

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1a Choose the Right Tool

Which tool to use:

- If single study: Analytic Study CAT or Descriptive Study CAT?
- If the article is about several studies use the Literature Review CAT

- What was study's purpose?
  - You will need to read enough of the study to know what they did and the purpose so you can name its design and decide which tool to use

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Example: Analytic Study

- Wilson CJ et al. (2018): SSI in overweight and obese total knee arthroplasty (TKA) patients
  Journal of Orthopedics; 15: 328–332

- 839 TKA patients followed for SSIs at 30 days by ICP and at one year for readmission
  - Followed prospectively
  - Standard definitions for SSI at 30 days
- Divided into 5 groups at baseline based on BMI: normal, overweight, obese classes I–III

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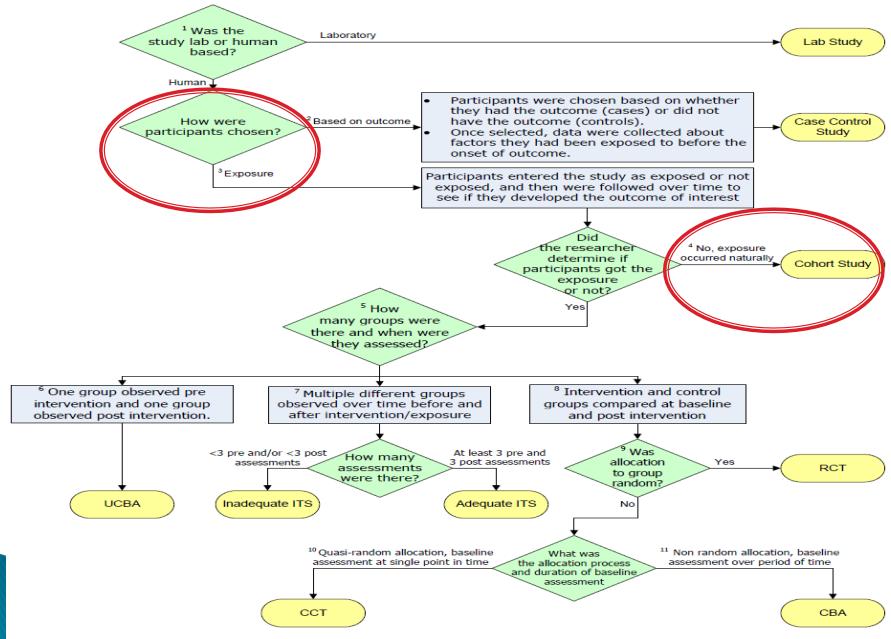
Figure 2: Algorithm – Naming the Type of Analytic Study



See the legend for an explanation of the numbered items and abbreviations

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Second Step: Appraise Quality

- Note: strength of design is not the same as the quality of the study
- The greater the inherent control of extraneous factors in the design, the stronger the design
  - Tool Kit rates strength of different designs: strong, moderate or weak
- Can have poorly conducted RCTs and surveys that are well done, so need to assess quality separately from strength

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Strength of Study Design

Strength of study design **Note: "x > y" means x is a stronger design than y**	**Strong**	**Meta-analysis › Randomized controlled trial (RCT) > controlled clinical trial (CCT) = lab experiment > controlled before-after (CBA)**
	Moderate	**Cohort > case-control > interrupted time series with adequate data collection points > cohort with non equivalent comparison group**
	Weak	**Uncontrolled before-after (UCBA) > interrupted time series with inadequate data collection points > descriptive (cross-sectional > ecological)**

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Appraise Quality Using Tool

- Read the study carefully to see how what was done relates to the criteria listed on the Tool
- Record decisions on Tool, with comments
- Refer to the Dictionary for explanations and further details about the criteria
- The more familiar one is with the criteria, the less one needs to refer to the Dictionary

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Example: Analytic Study Tool

Assess Internal Validity			
	Strong	**Moderate**	**Weak**
4. Adequacy of control of misclassifica-tion bias	Strong intervention integrity with clear definitions of exposure and outcome. Clear temporal association. No missing or inaccurate data. ☐	Strong intervention integrity with clear definitions. Clear temporal association. Some missing or inaccurate data likely creating misclassification in only a few participants. ☐	Any one item: Weak intervention integrity with unclear definitions. Unclear temporal association. Outcomes reported at aggregate level and unclear if individuals had intervention. Missing or inaccurate data likely creating misclassification in many. ☐
5. Adequacy of control of information bias	Assessors blinded and trained in data collection. Data collection was objective or response bias was minimized. ☐	Assessors were not blinded but trained in data collection. Response bias was minimized. ☐	Assessors were not blinded and unclear if trained in or adhered to data collection methods. Unclear if bias was sufficiently minimized. ☐

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Example: Analytic Study CAT Dictionary

5. Adequacy of control of information bias.

Information bias can occur from flawed procedures in collecting data.
Interviewers, for example, may vary in the way they ask questions of different individuals or interpret information. Participants with adverse health outcomes may recall previous experiences differently than those without the outcome (recall bias) or participants may give answers that are socially or politically correct or that they think the researcher wants to hear (social desirability or reporting bias). Strategies for reducing such biases include blinding of assessors as to intervention or exposure status of participants, standard protocols for data collection, training of assessors to promote inter-rater reliability and adherence to protocols, phrasing of questions, and measures (e.g., anonymity, developing rapport) to increase comfort levels for giving honest answers to difficult questions. Recall bias is problematic in case-control and retrospective cohort studies.

Strong:	Assessors were blinded as to group, were trained in data collection procedures, and strictly adhered to them; data collection measures were objective or phrased so as to minimize response biases.
Moderate:	Assessors were not blinded as to group, but were trained in data collection procedures and strictly adhered to them; attempts were taken to reduce response biases associated with data collection measures or phrasing of questions.
Weak:	Assessors were not blinded as to group, and it is not clear if they were trained in data collection procedures and/or strictly adhered to them. It is unclear if strategies were sufficient to reduce response biases associated with data collection measures or phrasing of questions.

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Example: Analytic Study CAT Dictionary

Not a substitute for training

5. Adequacy of control of information bias.

Information bias can occur from flawed procedures in collecting data.
Interviewers, for example, may vary in the way they ask questions of different individuals or interpret information. Participants with adverse health outcomes may recall previous experiences differently than those without the outcome (recall bias) or participants may give answers that are socially or politically correct or that they think the researcher wants to hear (social desirability or reporting bias). Strategies for reducing such biases include blinding of assessors as to intervention or exposure status of participants, standard protocols for data collection, training of assessors to promote inter-rater reliability and adherence to protocols, phrasing of questions, and measures (e.g., anonymity, developing rapport) to increase comfort levels for giving honest answers to difficult questions. Recall bias is problematic in case-control and retrospective cohort studies.

Judgment required to apply criteria

Strong:	Assessors were blinded as to group, were trained in da procedures, and strictly adhered to them; data collecti objective or phrased so as to minimize response biases.
Moderate:	Assessors were not blinded as to group, but were trained in a collection procedures and strictly adhered to them; attempt were taken to reduce response biases associated with data collection measures or phrasing of questions.
Weak:	Assessors were not blinded as to group, and it is not clear if they were trained in data collection procedures and/or strictly adhered to them. It is unclear if strategies were sufficient to reduce response biases associated with data collection measures or phrasing of questions.

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Type of Validity to Appraise

Purpose	Type of Validity	Assess (criteria related to)
Believe the study results: Alternate explanations ruled out	**Internal** validity	Threats to internal validity
Instrument used measures what it says it measures	**Instrument** validity	Content, construct validity, (reliability)
Applicable to your setting	**External** validity	Generalizability, feasibility

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Threats to Internal Validity

- Possible alternate explanations ruled out so x must lead to y
- Were threats adequately addressed in design or analysis?

General categories of threats to internal validity:

- **Bias: systematic error**
- Chance: random error
- Confounding: distortion of results by a third factor

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Threats to Internal Validity

- Possible alternate explanations ruled out so x must lead to y
- Were threats adequately addressed in design or analysis?

General categories of threats to internal validity:

- **Bias: systematic error**
- Chance: random error
- Confounding: distortion of results by a third factor

- **Information** bias
  - Data collectors influenced responses
  - Participants do not accurately recall the past
  - Participants say what they think the researchers want to hear
  - Instruments are not calibrated
  - Information is missing
- **Selection** bias
  - Volunteers
- **Misclassification** bias
  - Controls got part of intervention, or those in intervention group really didn't get it

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Analytic Study CAT: 15 Items

- Screening: 1 item
- Sampling: 2 items
- Internal validity: 4 items
- Control of Confounding: 2 items
- Ethics: 1 item
- Analysis: 2 items
- Applicability: 2 items
- Overall conclusion: 1 item

Multiple decision points

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Name Study Design

Select Study Design									
Strong Design				Moderate Design				Weak Design	
RCT	NRCT	Lab	CBA*	CBA*	Cohort	Case Control	ITS* (adequate)	UCBA	ITS* (inadequate)
					√				

*See Table 1 and legend for "Algorithm - Naming the Type of Analytical Study" for decision regarding CBA or ITS.

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Screening

1. Relevant to your purpose (e.g., population, intervention, outcome) and clear focus

Read the abstract and at least some of the methods to assess these items, then decide re continuing or not.

Screening Question			
	Strong	Moderate	Weak
1. Research question	Clearly focused. Highly relevant to Key Question. ☐ √	Fairly focused. Related to Key Question. ☐	Unclear or too broad. Unrelated to Key Question. ☐
Comments:			

Screening Decision
☐ **Reject (if weak)** **OR** ☐ **Continue**

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Assess Sampling

2. Study participants representative of target population
3. Adequacy of control of selection bias

Assessment of Study Population (Sample) and Sampling Method			
	Strong	**Moderate**	**Weak**
2. Study participants representative of target population	Multiple recruitment strategies used. Recruited/selected from a variety of locations or all of target population included. Participants (or lab sample) have targeted characteristics or appropriate database used. ☐	Participants recruited/selected from a single source that may have excluded members of target population. Participants (or sample) seem to have targeted characteristics. ☑	Participants are self-referred or volunteers. Participants (or sample) do not have targeted characteristics or cannot tell if they do. ☐
3. Adequacy of control of selection bias	Random sampling used. Similar recruitment/selection process applied to all; participation rates ≥80% in each group. Similar baseline characteristics.	Random sampling not used. Similar recruitment/selection process applied to all; participation rates ≥80% in each group. Similar baseline characteristics. ☑	Random sampling not used. Recruitment/selection process and major baseline characteristics may have differed. Less than 80% and/or different participation rates in groups.

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Assess Internal Validity (4 items)

	Strong	**Moderate**	**Weak**
4. Adequacy of control of misclassification bias	Strong intervention integrity with clear definitions of exposure and outcome. Clear temporal association. No missing or inaccurate data. Whether or not patients were blinded made no difference to data collected. ☑	Strong intervention integrity with clear definitions. Clear temporal association. Some missing or inaccurate data likely creating misclassification in only a few participants. Patients were not blinded and this might have made a difference to data collected. ☐	Any one item: Weak intervention integrity with unclear definitions. Unclear temporal association. Outcomes reported at aggregate level and unclear if individuals had intervention. Missing or inaccurate data likely creating misclassification in many participants. Patients were not blinded and it made a difference to data. ☐
5. Adequacy of control of information bias	Assessors blinded, trained in data collection and clearly adhered to procedures. Biases minimized with respect to data collection procedures and measures. ☐	Assessors were not blinded but trained in data collection and likely adhered to procedures. Biases reduced with respect to data collection procedures and measures. ☑	Assessors were not blinded and unclear if trained in or adhered to data collection methods. Unclear if bias was sufficiently reduced. ☐

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Internal Validity (continued)

	Strong	Moderate	Weak
6. Validity and reliability of data collection instruments	Tools are known or were shown to be valid and reliable. ☐	No attempt to assess validity and reliability of tools. Content validity can be assumed based on questions asked and expert involvement. ☑	No attempt to assess validity and reliability of tools. Neither can be assumed. ☐
7. Adequacy of retention and follow-up	>90% of participants completed study. Similar dropout rates between groups with reasons unrelated to exposure. ☑	≥80% of participants completed study. Little difference in dropout rates between groups with reasons unrelated to exposure. ☐	Any one item: <80% of participants completed study. Major difference in dropout rates between groups or dropout reasons could be related to exposure. ☐

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Assess Confounding

Assessment for Control of Confounding			
	Strong	**Moderate**	**Weak**
8. Comparability of control group and intervention group.	Groups were similar at baseline and assessed concurrently. Appropriate controls used in case-control study. ☐	Groups were comparable at baseline with minor differences. Appropriate controls in case-control study. ☑	Any one item: No concurrent control group or major differences existed between groups or similarity of groups was not assessed. ☐
9. Adequacy of control of major confounders	Appropriate randomization to groups or appropriate matching / statistical analysis / lab conditions adequate for controlling confounding. Major confounders examined. ☐	Unclear/inadequate randomization or inappropriate matching but statistical analysis adequately controlled for confounding or lab conditions only partially controlled for confounding. Major confounders examined. ☑	No randomization to groups or appropriate matching. Statistical analysis or lab conditions did not control for confounding. Major confounders not examined. ☐
Comments:			

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Assess Ethical Conduct

Ethics			
	Strong	**Moderate**	**Weak**
10. Adequacy of ethical conduct ☐ Not Applicable (see dictionary)	Study approved by appropriate ethics review board or sufficient details that conduct was ethical. Research report was not influenced. √		Insufficient details provided to draw conclusion on ethical conduct. Likelihood of research report being influenced could not be ruled out. ☐

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Assess Analysis

SSI at 30 days

- Normal BMI: 1.2%
- Overweight: 2.3%
- Obese class I:1.5%
- Obese class II:3.1%
- Obese class III: 8.2%

Fisher's Exact Test, no regression

- Obese class III vs. BMI < 40:
  - Females: OR 5.32 (CI: 1.68, 16.88)
  - Males: OR 2.47 (CI: 0.29, 20.97)
- Significant OR for deep space but not superficial

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Assess Analysis

Assessment of Analysis	Strong	Moderate	Weak
11. Adequacy and interpretation of statistical testing (See Table 5)	Statistical tests appropriate for level of data and hypothesis being tested. Probability values and confidence intervals interpreted correctly. ☐	Simple tests used correctly but data warranted more sophisticated tests. Control of confounding was limited. ☑	Tests were incorrect for data or information not given on tests used. Results not interpreted correctly. ☐
12. Power and sample size	Significant differences were found, thus sample size was sufficient or no significant differences found but researchers reported sufficient power. ☐	Significant differences not found and researchers reported that study power was insufficient. Sample size seemed reasonable. ☑	Significant differences not found and sample size was small. Adequacy of the study power not reported. ☐

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Assess Applicability

Assessment of Applicability ☐ Not applicable ☐ Not appraised	Strong	Moderate	Weak
13. Generalizability of results	Study population characteristics very similar to group to which one wishes to generalize results. ☐	Study population characteristics somewhat similar to group to which one wishes to generalize results. ☑	Study population characteristics not at all similar to group to which one wishes to generalize results. ☐
14. Feasibility of implementation	Intervention is highly likely to be readily implemented in other settings. ☐	Intervention is somewhat likely to be readily implemented or exposure is very likely amenable to an intervention that can be readily implemented. ☐	Intervention is unlikely to be readily implemented or exposure is unlikely amenable to an intervention that can be readily implemented. ☐

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Decision re Quality

Item	Strong	Moderate	Weak
2. Sample representative		X	
3. Control of selection bias		X	
4. Control of misclassification bias	X		
5. Control of information bias		X	
6. V&R of instruments		X	
7. Adequacy of retention	X		
8. Comparability of groups		X	
9. Control of major confounders		X	
10. Ethical conduct	X		
11. Stats testing		X	
12. Power and sample size		X	

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Overall Quality

Overall Conclusion

15. Summarize the results of the critical appraisal and complete the Evidence Summary Table. Note that you cannot make a recommendation based on a single study.

a) Identify the strength of study design (see "Select Study Design" at beginning of this tool)

☐ Strong ☐ Moderate ☐ Weak

b) Decision regarding quality of the study

Consider your ratings for appraisal items 2-12 and identify the appropriate rating for quality

☐ High ☐ Medium ☐ Low

Rate the quality as HIGH if: most or all appraisal items were rated as strong, and none were rated as weak. In addition, there are no major threats to internal validity of the study or the ability to draw the conclusion that there is a clear association between the exposure and the outcome of interest.

Rate the quality as MEDIUM if: appraisal items 4 and/or 11 are rated as at least moderate, and the other appraisal items rated as weak or moderate are not sufficient to compromise the internal validity of the study. Also, these other items do not interfere with the ability to draw the conclusion that there is a probable association between the exposure and the outcome of interest.

Rate the quality as LOW if: appraisal items 4 and/or 11 are rated as weak, or if other items rated as weak are sufficient to interfere with the ability to rule out other explanations for the findings and draw a conclusion about the association of the exposure and the outcome of interest.

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Overall Quality

Overall Conclusion

15. Summarize the results of the critical appraisal and complete the Evidence Summary Table. Note that you cannot make a recommendation based on a single study.

a) Identify the strength of study design (see "Select Study Design" at beginning of this tool)

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Rate the quality as MEDIUM if: appraisal items 4 and/or 11 are rated as at least moderate, and the other appraisal items rated as weak or moderate are not sufficient to compromise the internal validity of the study. Also, these other items do not interfere with the ability to draw the conclusion that there is a probable association between the exposure and the outcome of interest.

Rate the quality as LOW if: appraisal items 4 and/or 11 are rated as weak, other items rated as weak are sufficient to interfere with the ability to rule out other explanations or draw a conclusion about the association of the exposure and the outcome.

Discuss with colleagues!

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Summary of Study

- Moderate design
- Medium quality
- Provides evidence to support the effect of obesity (BMI >40) on SSI, especially deep SSI and in women
- Alone would not change practice but the warrants further research in terms of identifying strategies to reduce impact

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The Tools: Different Criteria

Analytic	Descriptive	Literature Review

• Representativeness of participants
• Adequacy of control of biases: selection, misclassification, information
• Validity and reliability of data collection instruments
• Adequacy of retention and follow-up
• Comparability of control and intervention groups
• Adequacy of control of major confounders
• Adequacy of ethical conduct
• Adequacy and interpretation of statistical testing
• Power and sample size
	• Representativeness
	• Data collection sources and methods
	• V&R of data collection instruments
	• Ethical conduct
	• Statistics
		• Screening: Relevance and General Methods
		• Methodology
		  • Comprehensive search for studies
		  • Rigorous review process
		  • Meta-analysis: reasonable to do one
		• Study Results (if strong/ moderate methods):
		  • Meaningful analysis and interpretation
		• Decisions:
		  • Results
		  • Directness of evidence
		• Applicability

Novices often just focus on n

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Literature Reviews

- Someone has done the work for you!
- Two types:
  - **Narrative**: summarize results but limited info re weaknesses, critical appraisal
    - Not appropriate for P&P
  - **Systematic**: comprehensive search for studies, clear appraisal methods and results
    - Assess and use results if high quality

Build on it!

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Step 3: Going from Individual Study to Body of Evidence

- Multiple studies read and appraised
- Each with ratings of quality and design
- How to pull it together?

Literature Summary Table can help you summarize information so that at a glance you can compare methods, results and ratings

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Evidence Summary Table

Review body of evidence: at a glance, can see number of studies, magnitude and consistency of results, and quality of studies

Ref. List # Author (Year) ID#	Methods and Outcome Measures	Results	Conclusions and Comments: Strength of Design, Quality and Directness of Evidence
Pichesathean 2004 #13369	Well-conducted systematic review	Identified multiple other studies not included here, with consistent results re reduction of microbial load with ABHR (different concentrations) in comparison to other solutions and on increasing compliance with hand hygiene.	**Multiple studies of strong design and high quality**
100 Kac 2005 #13230	5 wards, 10 HCWs per ward (multiple types of HCWs) Each performed 1 of 2 HH procedures per day (in random order): ABHR = Sterillium or HW with plain soap HH performed right after pt care activity Culture before and after HH	Significant reduction in CFUs for both HW (by 75%) and ABHR (by 99%), but decrease was significantly higher for ABHR ($p < .01$) 8 HCWs of 49 did not follow correct ABHR procedure 73% of those who failed to use correct HW technique did follow correct ABHR procedure	Controlled before-after, cross-over **Strong design** **High quality**
73 Lucet 2002 #13223	5-7 volunteers per ward, 7 wards Each performed 6 HH techniques in random order over one week, right after a procedure on the clinical unit Took a culture just before and after each HH technique HH techniques were ABHR (= Sterillium), HW with antiseptic soap for 10, 30 or 60 sec and HW with unmedicated soap for 10 or 30 sec.	Significant bacterial log reduction with HW with antiseptic soap (1.13-1.21) and ABHR (1.40) vs. HW with regular soap (.51-.74) No significant difference in bacterial reduction between HW with antiseptic soap and ABHR	Controlled before-after **Strong design** **High quality**

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Step 4: Make Recommendations

- This step depends on your purpose for critically appraising the literature
  - If there's a gap, recommend research
  - If evidence is strong, recommend a practice be adopted or considered for adoption
  - If evidence is weak, make recommendations on best possible evidence, and re-evaluate it sooner rather than later

Key flaw in critical appraisal by novices: Giving equal weight to all evidence, even when critical appraisal identified weaknesses

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Some Key Points

- Tool Kit does not replace need for training but can facilitate both learning and conducting critical appraisal
- Critical appraisal is a key skill to be developed
- There is a learning curve to doing critical appraisal but the more you practice, the easier it gets

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Conclusion

- Finding and evaluating evidence are key to evidence-informed IPAC practice
- Use criteria appropriate to study design
  - Be systematic in your approach
- Use appraisal results
  - e.g., focus on high quality not weak studies and appropriate conclusions
- Practice and discuss critical appraisal and use of literature e.g., Journal clubs

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One's mind, once stretched by a new idea, can never regain its original dimensions

Oliver Wendell Holmes (1809-1894)

Thank You!

Questions?

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September 6, 2018	MOLECULAR DIAGNOSTICS AND ITS ROLE IN INFECTION PREVENTION Speaker: **Sanchita Das**, University of Chicago
September 13, 2018	*(FREE Teleclass)* NEONATAL SEPSIS PREVENTION IN LOW-RESOURCE SETTINGS Speaker: **Prof. Dr Angela Dramowski**, Stellenbosch University, Cape Town
September 20, 2018	THE SILENT TSUNAMI OF AZOLE-RESISTANCE IN THE OPPORTUNISTIC FUNGUS *ASPERGILLUS FUMIGATUS* Speaker: **Prof. Paul E. Verweij**, Radboud University Center of Expertise in Mycology, The Netherlands
September 27, 2018	CHLORHEXIDINE USE AND BACTERIAL RESISTANCE Speaker: **Prof. Jean Yves Maillard**, Cardiff University, Wales
September 30, 2018	*(FREE European Teleclass - Broadcast live from the 2018 IPS conference)* ***Cottrell Lecture ...*** SURVEILLANCE BY OBJECTIVES: USING MEASUREMENT IN THE PREVENTION OF HEALTHCARE ASSOCIATED INFECTIONS Speaker: **Prof. Jennie Wilson**, University of West London
October 2, 2018	*(FREE European Teleclass - Broadcast live from the 2018 IPS conference)* ***Ayliffe Lecture ...*** (TO BE POSTED) Speaker: **Prof. Shaheen Mehtar**, Stellenbosch University, Cape Town, South Africa
	(FREE CBIC Teleclass)

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