

# Where is the strength of evidence? A review of infection prevention and control guidelines

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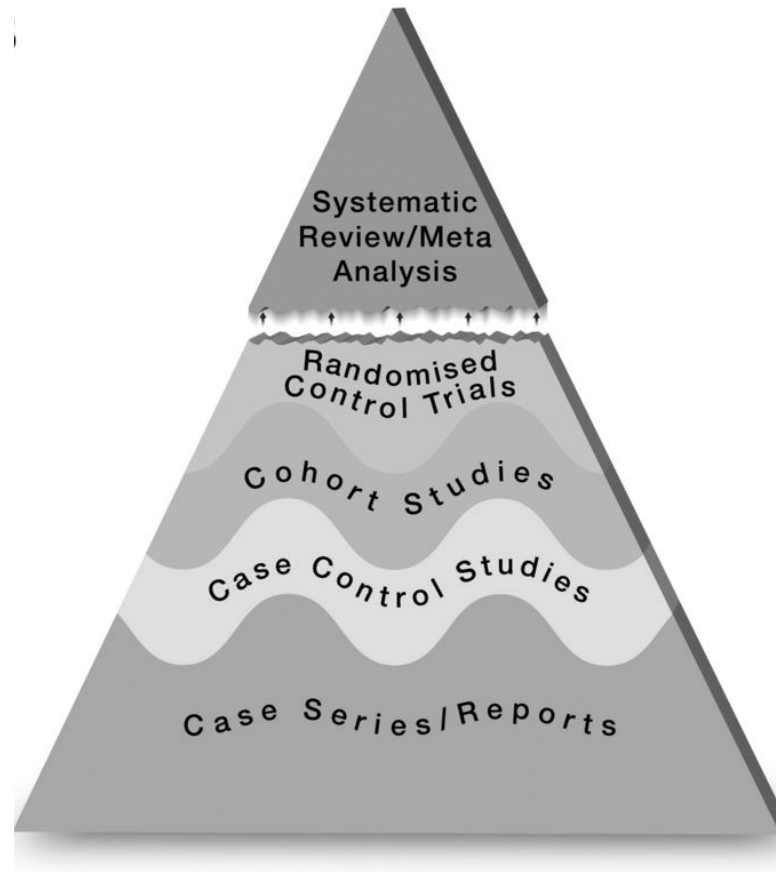
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# Quality of care

- IPC relies on application of clinical guidelines
  - Reduces variability, improves quality
- Clinical guidelines informed by systematic reviews of available evidence
  - Benefits and harms of alternates
- No previous study on the strength of the evidence that inform IPC guidelines



Murad, M. Het al (2016). *BMJ Evidence-Based Medicine*, 21(4), 125-127

# Aims

1. To describe the diversity of professional and government sponsored infection prevention and control guidelines
2. Where recommendations are made within professional and government sponsored infection prevention and control guidelines, to describe:
  - a. the breadth and diversity of recommendations contained in these guidelines
  - b. the strength of the evidence under- pinning recommendations
  - c. the infection prevention and control topics with the lowest and highest strength of recommendations

# Method

## **Search known government and professional organisations**

- The Centers for Disease Control and Prevention (CDC)/Healthcare Infection Control Practices Advisory Committee (HICPAC)
- Infectious Diseases Society of America (IDSA),
- Society for Healthcare Epidemiology of America (SHEA)
- Association for Professionals in Infection Control and Epidemiology (APIC)
- Australian National Health and Medical Research Council (NHMRC)
- National Institute for Health and Care Excellence (NICE)
- National Health Service (NHS) England,
- Infection Prevention Society (IPS),
- European Society of Clinical Microbiology and Infectious Diseases (ESCMID),
- World Health Organization (WHO) and the
- Public Health Agency of Canada (PHAC)

Other guidelines identified in this search

# Criteria

## **Inclusion**

- published from January 2009 to April 2019
- published with the intent of being a national guideline or for national adoption
- included recommendations for persons of all ages in healthcare settings
- published in the English language;
- used a formal grading system (using any criteria, e.g., Grading of Recommendations Assessment, Development and Evaluation (GRADE)) to show the strength of the recommendations underpinning the guideline;
- focused on specific infections, e.g., epic3 guidelines for preventing healthcare-associated infections or those targeting specific aspects of infection control, e.g., hand hygiene and vascular access device

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- primarily concerned with diagnosis and/or treatment of infection; or if the guidelines were focused on a particular jurisdiction, e.g., a State in a country.

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## Definition

An infection prevention and control clinical guideline was defined as a document that evaluated the current evidence base of an infection prevention and control topic or topics and used a formal grading system (e.g., GRADE) to show the strength of the recommendation(s) stated



# Data extraction

- publication year
- country of origin
- name of guideline
- publisher
- source and each stated recommendation(s)
- type of grading system used and strength of the recommendation
- for each recommendation, the broad infection prevention and control category was determined (these were collapsed into broader categories)

# Data extraction

## Broad categories

- hand hygiene
- cleaning
- sterilization
- education
- devices
- screening
- implementation
- surveillance
- skin antisepsis
- antimicrobial prophylaxis
- transmission-based precautions
- patient-focused strategies
- personnel
- infection prevention and control program
- outbreaks
- vaccination
- sharps
- ventilation
- reporting

# Strength of recommendation

**Level 1** - meta-analyses, systematic reviews of randomized controlled trials (RCTs)

**Level 2** - well-designed RCTs, strong recommendation from high-quality evidence

**Level 3** - well-designed non-randomized studies including observational studies (case-control, cohort and cross-sectional), moderate evidence

# Strength of recommendation

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**Level 3** - well-designed non-randomized studies including observational studies (case-control, cohort and cross-sectional), moderate evidence

**Level 4** - descriptive studies, expert opinion, low-quality evidence

**Level 5** - poor/insufficient evidence, very-low-quality evidence

**Level 6** - recommended best practice, good practice point

**Level 7** - unresolved issue, no recommendation

**Level 8** - legislated requirement

# Results

- 31 guidelines were included
- Majority published in 2013 (16%) and 2014 (26%)
- USA 36%
- Canada 29%

## Grading

- 19% used GRADE
- 23% incorporated elements of GRADE

# Recommendations

Category	N (%)
Devices	318 (17.1)
Transmission-based precautions	314 (16.9)
Hand hygiene	169 (9.1)
Cleaning	151 (8.1)
Sterilization	149 (8.0)
Implementation	113 (6.1)
Education	89 (4.8)
Screening	89 (4.8)
Antimicrobial prophylaxis	71 (3.8)
Personnel	70 (3.8)
Surveillance	46 (2.5)
Skin antisepsis	49 (2.6)
Adherence	35 (1.9)
Reporting	34 (1.8)
Supplies	32 (1.7)
Ventilation	32 (1.7)
Patient-focused strategies	23 (1.2)
Sharps	23 (1.2)
Outbreak	20 (1.1)
Infection control programme	16 (0.9)
Vaccination	12 (0.6)
Total	1855 (100.0)

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Total	1855 (100.0)

# Strength of recommendations

Category	Grade level								Total
	N (%)								
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	
Adherence	1 (2.9)	8 (22.9)	7 (20.0)	<b>18 (51.4)</b>	1 (2.9)	0 (0)	0 (0)	0 (0)	35 (100.0)
Antimicrobial prophylaxis	0 (0)	<b>19 (26.8)</b>	<b>19 (26.8)</b>	13 (18.3)	3 (4.2)	2 (2.8)	14 (19.7)	1 (1.4)	71 (100.0)
Cleaning	1 (0.7)	6 (4.0)	20 (13.2)	<b>101 (66.9)</b>	1 (0.7)	4 (2.6)	5 (3.3)	13 (8.6)	151 (100.0)
Devices	<b>13 (4.1)</b>	<b>64 (20.1)</b>	<b>74 (23.3)</b>	<b>125 (39.3)</b>	0 (0)	0 (0)	41 (12.9)	1 (0.3)	318 (100.0)
Education	1 (1.1)	13 (14.6)	16 (18.0)	<b>45 (50.6)</b>	2 (2.2)	6 (6.7)	1 (1.1)	5 (5.6)	89 (100.0)
Hand hygiene	6 (3.6)	<b>57 (33.7)</b>	42 (24.9)	45 (26.6)	4 (2.4)	7 (4.1)	3 (1.8)	5 (3.0)	169 (100.0)
Infection control programme	0 (0)	0 (0)	3 (18.8)	2 (12.5)	2 (12.5)	1 (6.3)	<b>8 (50.0)</b>	0 (0)	16 (100.0)
Implementation	1 (0.9)	25 (22.1)	26 (23.0)	<b>41 (36.3)</b>	3 (2.7)	2 (1.8)	11 (9.7)	4 (3.5)	113 (100.0)
Outbreak	0 (0)	1 (5.0)	1 (5.0)	<b>9 (45.0)</b>	0 (0)	6 (30.0)	0 (0)	3 (15.0)	20 (100.0)
Patient-focused strategies	0 (0)	2 (8.7)	5 (21.7)	<b>11 (47.8)</b>	2 (8.7)	0 (0)	3 (13.0)	0 (0)	23 (100.0)
Personnel	1 (1.4)	5 (7.1)	7 (10.0)	<b>46 (65.7)</b>	2 (2.9)	3 (4.3)	4 (5.7)	2 (2.9)	70 (100.0)
Reporting	0 (0)	1 (2.9)	5 (14.7)	9 (26.5)	0 (0)	<b>12 (35.3)</b>	0 (0)	7 (20.6)	34 (100.0)
Screening	0 (0)	10 (11.2)	17 (19.1)	<b>39 (43.8)</b>	5 (5.6)	4 (4.5)	14 (15.7)	0 (0)	89 (100.0)
Sharps	0 (0)	1 (4.3)	1 (4.3)	<b>14 (60.9)</b>	0 (0)	1 (4.3)	0 (0)	6 (26.1)	23 (100.0)
Skin antiseptics	2 (4.1)	<b>14 (28.6)</b>	10 (20.4)	9 (18.4)	1 (2.0)	2 (4.1)	11 (22.4)	0 (0)	49 (100.0)
Sterilization	0 (0)	33 (22.1)	27 (18.1)	25 (16.8)	0 (0)	1 (0.7)	3 (2.0)	<b>60 (40.3)</b>	149 (100.0)
Supplies	0 (0)	5 (15.6)	<b>13 (40.6)</b>	6 (18.8)	2 (6.3)	1 (3.1)	4 (12.5)	1 (3.1)	32 (100.0)
Surveillance	0 (0)	4 (8.7)	8 (17.4)	<b>24 (52.2)</b>	3 (6.5)	4 (8.7)	1 (2.2)	2 (4.3)	46 (100.0)
Transmission-based precautions	2 (0.6)	32 (10.2)	65 (20.7)	<b>169 (53.8)</b>	9 (2.9)	13 (4.1)	11 (3.5)	13 (4.1)	314 (100.0)
Vaccination	0 (0)	<b>3 (25.0)</b>	2 (16.7)	1 (8.3)	0 (0)	<b>3 (25.0)</b>	0 (0)	<b>3 (25.0)</b>	12 (100.0)
Ventilation	0 (0)	8 (25.0)	6 (18.8)	<b>17 (53.1)</b>	1 (3.1)	0 (0)	0 (0)	0 (0)	32 (100.0)
Total	28 (1.5)	311 (16.8)	374 (20.2)	769 (41.5)	41 (2.2)	72 (3.9)	134 (7.2)	126 (6.8)	1855 (100.0)

Figures in bold indicate where the highest proportion of recommendations fall for each category.

Category	Grade level N (%)								Total
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	
Adherence	1 (2.9)	8 (22.9)	7 (20.0)	<b>18 (51.4)</b>	1 (2.9)	0 (0)	0 (0)	0 (0)	35 (100.0)
Antimicrobial prophylaxis	0 (0)	<b>19 (26.8)</b>	<b>19 (26.8)</b>	13 (18.3)	3 (4.2)	2 (2.8)	14 (19.7)	1 (1.4)	71 (100.0)
Cleaning	1 (0.7)	6 (4.0)	20 (13.2)	<b>101 (66.9)</b>	1 (0.7)	4 (2.6)	5 (3.3)	13 (8.6)	151 (100.0)
Devices	13 (4.1)	64 (20.1)	74 (23.3)	<b>125 (39.3)</b>	0 (0)	0 (0)	41 (12.9)	1 (0.3)	318 (100.0)
Education	1 (1.1)	13 (14.6)	16 (18.0)	<b>45 (50.6)</b>	2 (2.2)	6 (6.7)	1 (1.1)	5 (5.6)	89 (100.0)
Hand hygiene	6 (3.6)	<b>57 (33.7)</b>	42 (24.9)	45 (26.6)	4 (2.4)	7 (4.1)	3 (1.8)	5 (3.0)	169 (100.0)
Infection control programme	0 (0)	0 (0)	3 (18.8)	2 (12.5)	2 (12.5)	1 (6.3)	<b>8 (50.0)</b>	0 (0)	16 (100.0)
Implementation	1 (0.9)	25 (22.1)	26 (23.0)	<b>41 (36.3)</b>	3 (2.7)	2 (1.8)	11 (9.7)	4 (3.5)	113 (100.0)
Outbreak	0 (0)	1 (5.0)	1 (5.0)	<b>9 (45.0)</b>	0 (0)	6 (30.0)	0 (0)	3 (15.0)	20 (100.0)
Patient-focused strategies	0 (0)	2 (8.7)	5 (21.7)	<b>11 (47.8)</b>	2 (8.7)	0 (0)	3 (13.0)	0 (0)	23 (100.0)
Personnel	1 (1.4)	5 (7.1)	7 (10.0)	<b>46 (65.7)</b>	2 (2.9)	3 (4.3)	4 (5.7)	2 (2.9)	70 (100.0)
Reporting	0 (0)	1 (2.9)	5 (14.7)	9 (26.5)	0 (0)	<b>12 (35.3)</b>	0 (0)	7 (20.6)	34 (100.0)
Screening	0 (0)	10 (11.2)	17 (19.1)	<b>39 (43.8)</b>	5 (5.6)	4 (4.5)	14 (15.7)	0 (0)	89 (100.0)
Sharps	0 (0)	1 (4.3)	1 (4.3)	<b>14 (60.9)</b>	0 (0)	1 (4.3)	0 (0)	6 (26.1)	23 (100.0)
Skin antisepsis	2 (4.1)	<b>14 (28.6)</b>	10 (20.4)	9 (18.4)	1 (2.0)	2 (4.1)	11 (22.4)	0 (0)	49 (100.0)
Sterilization	0 (0)	33 (22.1)	27 (18.1)	25 (16.8)	0 (0)	1 (0.7)	3 (2.0)	<b>60 (40.3)</b>	149 (100.0)
Supplies	0 (0)	5 (15.6)	<b>13 (40.6)</b>	6 (18.8)	2 (6.3)	1 (3.1)	4 (12.5)	1 (3.1)	32 (100.0)
Surveillance	0 (0)	4 (8.7)	8 (17.4)	<b>24 (52.2)</b>	3 (6.5)	4 (8.7)	1 (2.2)	2 (4.3)	46 (100.0)
Transmission-based precautions	2 (0.6)	32 (10.2)	65 (20.7)	<b>169 (53.8)</b>	9 (2.9)	13 (4.1)	11 (3.5)	13 (4.1)	314 (100.0)
Vaccination	0 (0)	<b>3 (25.0)</b>	2 (16.7)	1 (8.3)	0 (0)	<b>3 (25.0)</b>	0 (0)	<b>3 (25.0)</b>	12 (100.0)
Ventilation	0 (0)	8 (25.0)	6 (18.8)	<b>17 (53.1)</b>	1 (3.1)	0 (0)	0 (0)	0 (0)	32 (100.0)
<b>Total</b>	<b>28 (1.5)</b>	<b>311 (16.8)</b>	<b>374 (20.2)</b>	<b>769 (41.5)</b>	<b>41 (2.2)</b>	<b>72 (3.9)</b>	<b>134 (7.2)</b>	<b>126 (6.8)</b>	<b>1855 (100.0)</b>

Figures in bold indicate where the highest proportion of recommendations fall for each category.



Category	Grade level								Total
	N (%)								
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	
Adherence	1 (2.9)	8 (22.9)	7 (20.0)	<b>18 (51.4)</b>	1 (2.9)	0 (0)	0 (0)	0 (0)	35 (100.0)
Antimicrobial prophylaxis	0 (0)	<b>19 (26.8)</b>	<b>19 (26.8)</b>	13 (18.3)	3 (4.2)	2 (2.8)	14 (19.7)	1 (1.4)	71 (100.0)
Cleaning	1 (0.7)	6 (4.3)	20 (13.2)	<b>101 (66.9)</b>	1 (0.7)	4 (2.6)	5 (3.3)	13 (8.6)	151 (100.0)
Devices	13 (4.1)	64 (20.0)	11 (23.3)	<b>125 (39.3)</b>	0 (0)	0 (0)	41 (12.9)	1 (0.3)	318 (100.0)
Education	1 (1.1)	11 (12.2)	11 (12.2)	11 (12.2)	2 (2.2)	6 (6.7)	1 (1.1)	5 (5.6)	89 (100.0)
Hand hygiene	6 (3.6)	<b>51 (28.8)</b>	11 (6.2)	11 (6.2)	4 (2.4)	7 (4.1)	3 (1.8)	5 (3.0)	169 (100.0)
Infection control programme	0 (0)	0 (0)	0 (0)	0 (0)	2 (12.5)	1 (6.3)	<b>8 (50.0)</b>	0 (0)	16 (100.0)
Implementation	1 (0.9)	25 (22.7)	11 (10.0)	11 (10.0)	3 (2.7)	2 (1.8)	11 (9.7)	4 (3.5)	113 (100.0)
Outbreak	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	6 (30.0)	0 (0)	3 (15.0)	20 (100.0)
Patient-focused strategies	0 (0)	2 (8.7)	3 (21.7)	<b>11 (77.8)</b>	2 (8.7)	0 (0)	3 (13.0)	0 (0)	23 (100.0)
Personnel	1 (1.4)	5 (7.1)	7 (10.0)	<b>46 (65.7)</b>	2 (2.9)	3 (4.3)	4 (5.7)	2 (2.9)	70 (100.0)
Reporting	0 (0)	1 (2.9)	5 (14.7)	9 (26.5)	0 (0)	<b>12 (35.3)</b>	0 (0)	7 (20.6)	34 (100.0)
Screening	0 (0)	10 (11.2)	17 (19.1)	<b>39 (43.8)</b>	5 (5.6)	4 (4.5)	14 (15.7)	0 (0)	89 (100.0)
Sharps	0 (0)	1 (4.3)	1 (4.3)	<b>14 (60.9)</b>	0 (0)	1 (4.3)	0 (0)	6 (26.1)	23 (100.0)
Skin antisepsis	2 (4.1)	<b>14 (28.6)</b>	10 (20.4)	9 (18.4)	1 (2.0)	2 (4.1)	11 (22.4)	0 (0)	49 (100.0)
Sterilization	0 (0)	33 (22.1)	27 (18.1)	25 (16.8)	0 (0)	1 (0.7)	3 (2.0)	<b>60 (40.3)</b>	149 (100.0)
Supplies	0 (0)	5 (15.6)	<b>13 (40.6)</b>	6 (18.8)	2 (6.3)	1 (3.1)	4 (12.5)	1 (3.1)	32 (100.0)
Surveillance	0 (0)	4 (8.7)	8 (17.4)	<b>24 (52.2)</b>	3 (6.5)	4 (8.7)	1 (2.2)	2 (4.3)	46 (100.0)
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Vaccination	0 (0)	<b>3 (25.0)</b>	2 (16.7)	1 (8.3)	0 (0)	<b>3 (25.0)</b>	0 (0)	<b>3 (25.0)</b>	12 (100.0)
Ventilation	0 (0)	8 (25.0)	6 (18.8)	<b>17 (53.1)</b>	1 (3.1)	0 (0)	0 (0)	0 (0)	32 (100.0)
<b>Total</b>	<b>28 (1.5)</b>	<b>311 (16.8)</b>	<b>374 (20.2)</b>	<b>769 (41.5)</b>	<b>41 (2.2)</b>	<b>72 (3.9)</b>	<b>134 (7.2)</b>	<b>126 (6.8)</b>	<b>1855 (100.0)</b>

Figures in bold indicate where the highest proportion of recommendations fall for each category.

Category	Grade level N (%)								Total
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	
Adherence	1 (2.9)	8 (22.9)	7 (20.0)	<b>18 (51.4)</b>	1 (2.9)	0 (0)	0 (0)	0 (0)	35 (100.0)
Antimicrobial prophylaxis	0 (0)	<b>19 (26.8)</b>	<b>19 (26.8)</b>	13 (18.3)	3 (4.2)	2 (2.8)	14 (19.7)	1 (1.4)	71 (100.0)
Cleaning	1 (0.7)	6 (4.3)	20 (13.2)	<b>101 (66.9)</b>	1 (0.7)	4 (2.6)	5 (3.3)	13 (8.6)	151 (100.0)
Devices	<b>13 (4.1)</b>	64 (20.0)	14 (23.3)	<b>125 (39.3)</b>	0 (0)	0 (0)	41 (12.9)	1 (0.3)	318 (100.0)
Education	1 (1.1)	11 (12.2)	11 (12.2)	11 (12.2)	2 (2.2)	6 (6.7)	1 (1.1)	5 (5.6)	89 (100.0)
Hand hygiene	<b>6 (3.6)</b>	<b>51 (28.6)</b>	11 (6.2)	11 (6.2)	4 (2.4)	7 (4.1)	3 (1.8)	5 (3.0)	169 (100.0)
Infection control programme	0 (0)	0 (0)	0 (0)	0 (0)	2 (12.5)	1 (6.3)	<b>8 (50.0)</b>	0 (0)	16 (100.0)
Implementation	1 (0.9)	25 (22.7)	11 (10.0)	11 (10.0)	3 (2.7)	2 (1.8)	11 (9.7)	4 (3.5)	113 (100.0)
Outbreak	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	6 (30.0)	0 (0)	3 (15.0)	20 (100.0)
Patient-focused strategies	0 (0)	2 (8.7)	3 (21.7)	<b>11 (77.8)</b>	2 (8.7)	0 (0)	3 (13.0)	0 (0)	23 (100.0)
Personnel	1 (1.4)	5 (7.1)	7 (10.0)	<b>46 (65.7)</b>	2 (2.9)	3 (4.3)	4 (5.7)	2 (2.9)	70 (100.0)
Reporting	0 (0)	1 (2.9)	5 (14.7)	9 (26.5)	0 (0)	<b>12 (35.3)</b>	0 (0)	7 (20.6)	34 (100.0)
Screening	0 (0)	10 (11.2)	17 (19.1)	<b>39 (43.8)</b>	5 (5.6)	4 (4.5)	14 (15.7)	0 (0)	89 (100.0)
Sharps	0 (0)	1 (4.3)	1 (4.3)	<b>14 (60.9)</b>	0 (0)	1 (4.3)	0 (0)	6 (26.1)	23 (100.0)
Skin antisepsis	<b>2 (4.1)</b>	<b>14 (28.6)</b>	10 (20.4)	9 (18.4)	1 (2.0)	2 (4.1)	11 (22.4)	0 (0)	49 (100.0)
Sterilization	0 (0)	33 (22.1)	27 (18.1)	25 (16.8)	0 (0)	1 (0.7)	3 (2.0)	<b>60 (40.3)</b>	149 (100.0)
Supplies	0 (0)	5 (15.6)	<b>13 (40.6)</b>	6 (18.8)	2 (6.3)	1 (3.1)	4 (12.5)	1 (3.1)	32 (100.0)
Surveillance	0 (0)	4 (8.7)	8 (17.4)	<b>24 (52.2)</b>	3 (6.5)	4 (8.7)	1 (2.2)	2 (4.3)	46 (100.0)
Transmission-based precautions	<b>2 (0.6)</b>	32 (10.2)	65 (20.7)	<b>169 (53.8)</b>	9 (2.9)	13 (4.1)	11 (3.5)	13 (4.1)	314 (100.0)
Vaccination	0 (0)	<b>3 (25.0)</b>	2 (16.7)	1 (8.3)	0 (0)	<b>3 (25.0)</b>	0 (0)	<b>3 (25.0)</b>	12 (100.0)
Ventilation	0 (0)	8 (25.0)	6 (18.8)	<b>17 (53.1)</b>	1 (3.1)	0 (0)	0 (0)	0 (0)	32 (100.0)
Total	28 (1.5)	311 (16.8)	374 (20.2)	769 (41.5)	41 (2.2)	72 (3.9)	134 (7.2)	126 (6.8)	1855 (100.0)

Figures in bold indicate where the highest proportion of recommendations fall for each category.



Category	Grade level									Total
	N (%)									
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8		
Adherence	1 (2.9)	8 (22.9)	7 (20.0)	<b>18 (51.4)</b>	1 (2.9)	0 (0)	0 (0)	0 (0)	35 (100.0)	
Antimicrobial prophylaxis	0 (0)	<b>19 (26.8)</b>	19 (26.8)	13 (18.3)	3 (4.2)	2 (2.8)	14 (19.7)	1 (1.4)	71 (100.0)	
Cleaning	1 (0.7)	6 (4.0)	20 (14.3)	<b>101 (66.9)</b>	1 (0.7)	4 (2.6)	5 (3.3)	13 (8.6)	151 (100.0)	
Devices	13 (4.1)	64 (20.1)	74 (22.9)	5 (29.3)	0 (0)	0 (0)	41 (12.9)	1 (0.3)	318 (100.0)	
Education	1 (1.1)	13 (14.6)	16 (17.8)	11 (12.2)	2 (2.2)	6 (6.7)	1 (1.1)	5 (5.6)	89 (100.0)	
Hand hygiene	6 (3.6)	<b>57 (33.7)</b>	47 (28.7)	11 (6.8)	2 (1.2)	7 (4.1)	3 (1.8)	5 (3.0)	169 (100.0)	
Infection control programme	0 (0)	0 (0)	3 (3.0)	1 (1.0)	1 (1.0)	1 (6.3)	<b>8 (50.0)</b>	0 (0)	16 (100.0)	
Implementation	1 (0.9)	25 (22.1)	26 (23.0)	11 (9.7)	2 (1.8)	2 (1.8)	11 (9.7)	4 (3.5)	113 (100.0)	
Outbreak	0 (0)	1 (5.0)	1 (5.0)	1 (5.0)	1 (5.0)	6 (30.0)	0 (0)	3 (15.0)	20 (100.0)	
Patient-focused strategies	0 (0)	2 (8.7)	5 (21.7)	<b>11 (47.8)</b>	2 (8.7)	0 (0)	3 (13.0)	0 (0)	23 (100.0)	
Personnel	1 (1.4)	5 (7.1)	7 (10.0)	<b>46 (65.7)</b>	2 (2.9)	3 (4.3)	4 (5.7)	2 (2.9)	70 (100.0)	
Reporting	0 (0)	1 (2.9)	5 (14.7)	9 (26.5)	0 (0)	<b>12 (35.3)</b>	0 (0)	7 (20.6)	34 (100.0)	
Screening	0 (0)	10 (11.2)	17 (19.1)	<b>39 (43.8)</b>	5 (5.6)	4 (4.5)	14 (15.7)	0 (0)	89 (100.0)	
Sharps	0 (0)	1 (4.3)	1 (4.3)	<b>14 (60.9)</b>	0 (0)	1 (4.3)	0 (0)	6 (26.1)	23 (100.0)	
Skin antisepsis	2 (4.1)	<b>14 (28.6)</b>	10 (20.4)	9 (18.4)	1 (2.0)	2 (4.1)	11 (22.4)	0 (0)	49 (100.0)	
Sterilization	0 (0)	33 (22.1)	27 (18.1)	25 (16.8)	0 (0)	1 (0.7)	3 (2.0)	<b>60 (40.3)</b>	149 (100.0)	
Supplies	0 (0)	5 (15.6)	<b>13 (40.6)</b>	6 (18.8)	2 (6.3)	1 (3.1)	4 (12.5)	1 (3.1)	32 (100.0)	
Surveillance	0 (0)	4 (8.7)	8 (17.4)	<b>24 (52.2)</b>	3 (6.5)	4 (8.7)	1 (2.2)	2 (4.3)	46 (100.0)	
Transmission-based precautions	2 (0.6)	32 (10.2)	65 (20.7)	<b>169 (53.8)</b>	9 (2.9)	13 (4.1)	11 (3.5)	13 (4.1)	314 (100.0)	
Vaccination	0 (0)	<b>3 (25.0)</b>	2 (16.7)	1 (8.3)	0 (0)	<b>3 (25.0)</b>	0 (0)	<b>3 (25.0)</b>	12 (100.0)	
Ventilation	0 (0)	8 (25.0)	6 (18.8)	<b>17 (53.1)</b>	1 (3.1)	0 (0)	0 (0)	0 (0)	32 (100.0)	
Total	28 (1.5)	311 (16.8)	374 (20.2)	769 (41.5)	41 (2.2)	72 (3.9)	134 (7.2)	126 (6.8)	1855 (100.0)	

Level 2 – Well designed RCTs, strong recommendation from high quality evidence

Figures in bold indicate where the highest proportion of recommendations fall for each category.

Category	Grade level N (%)								Total
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	
Adherence	1 (2.9)	8 (22.9)	7 (20.0)	18 (51.4)	1 (2.9)	0 (0)	0 (0)	0 (0)	35 (100.0)
Antimicrobial prophylaxis	0 (0)	<b>19 (26.8)</b>	<b>19 (26.8)</b>	13 (18.3)	3 (4.2)	2 (2.8)	14 (19.7)	1 (1.4)	71 (100.0)
Cleaning	1 (0.7)	6 (4.0)	20 (13.2)	101 (65.9)	1 (0.7)	4 (2.6)	5 (3.3)	13 (8.6)	151 (100.0)
Devices	13 (4.1)	64 (20.1)	74 (23.3)	125 (38.8)	0 (0)	0 (0)	41 (12.9)	1 (0.3)	318 (100.0)
Education	1 (1.1)	13 (14.6)	16 (18.0)	21 (23.6)	2 (2.2)	0 (0)	1 (1.1)	5 (5.6)	89 (100.0)
Hand hygiene	6 (3.6)	<b>57 (33.7)</b>	42 (24.9)	31 (18.0)	0 (0)	0 (0)	3 (1.8)	5 (3.0)	169 (100.0)
Infection control programme	0 (0)	0 (0)	3 (18.8)	11 (71.5)	0 (0)	0 (0)	<b>8 (50.0)</b>	0 (0)	16 (100.0)
Implementation	1 (0.9)	25 (22.1)	26 (23.0)	21 (18.7)	2 (1.8)	0 (0)	11 (9.7)	4 (3.5)	113 (100.0)
Outbreak	0 (0)	1 (5.0)	1 (5.0)	11 (55.0)	2 (10.0)	0 (0)	0 (0)	3 (15.0)	20 (100.0)
Patient-focused strategies	0 (0)	2 (8.7)	5 (21.7)	11 (47.8)	2 (8.7)	0 (0)	3 (13.0)	0 (0)	23 (100.0)
Personnel	1 (1.4)	5 (7.1)	7 (10.0)	<b>46 (65.7)</b>	2 (2.9)	3 (4.3)	4 (5.7)	2 (2.9)	70 (100.0)
Reporting	0 (0)	1 (2.9)	5 (14.7)	9 (26.5)	0 (0)	<b>12 (35.3)</b>	0 (0)	7 (20.6)	34 (100.0)
Screening	0 (0)	10 (11.2)	17 (19.1)	<b>39 (43.8)</b>	5 (5.6)	4 (4.5)	14 (15.7)	0 (0)	89 (100.0)
Sharps	0 (0)	1 (4.3)	1 (4.3)	<b>14 (60.9)</b>	0 (0)	1 (4.3)	0 (0)	6 (26.1)	23 (100.0)
Skin antisepsis	2 (4.1)	<b>14 (28.6)</b>	10 (20.4)	9 (18.4)	1 (2.0)	2 (4.1)	11 (22.4)	0 (0)	49 (100.0)
Sterilization	0 (0)	33 (22.1)	27 (18.1)	25 (16.8)	0 (0)	1 (0.7)	3 (2.0)	<b>60 (40.3)</b>	149 (100.0)
Supplies	0 (0)	5 (15.6)	<b>13 (40.6)</b>	6 (18.8)	2 (6.3)	1 (3.1)	4 (12.5)	1 (3.1)	32 (100.0)
Surveillance	0 (0)	4 (8.7)	8 (17.4)	<b>24 (52.2)</b>	3 (6.5)	4 (8.7)	1 (2.2)	2 (4.3)	46 (100.0)
Transmission-based precautions	2 (0.6)	32 (10.2)	65 (20.7)	<b>169 (53.8)</b>	9 (2.9)	13 (4.1)	11 (3.5)	13 (4.1)	314 (100.0)
Vaccination	0 (0)	<b>3 (25.0)</b>	2 (16.7)	1 (8.3)	0 (0)	<b>3 (25.0)</b>	0 (0)	<b>3 (25.0)</b>	12 (100.0)
Ventilation	0 (0)	8 (25.0)	6 (18.8)	<b>17 (53.1)</b>	1 (3.1)	0 (0)	0 (0)	0 (0)	32 (100.0)
Total	28 (1.5)	311 (16.8)	374 (20.2)	769 (41.5)	41 (2.2)	72 (3.9)	134 (7.2)	126 (6.8)	1855 (100.0)

Level 3 – Well designed non-RCTs including observational studies (C-C, C & CS) moderate evidence

Figures in bold indicate where the highest proportion of recommendations fall for each category.



Category	Grade level N (%)								Total
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	
Adherence	1 (2.9)	8 (22.9)	7 (20.0)	<b>18 (51.4)</b>	1 (2.9)	0 (0)	0 (0)	0 (0)	35 (100.0)
Antimicrobial prophylaxis	0 (0)	<b>19 (26.8)</b>	<b>19 (26.8)</b>	13 (18.3)	5 (7.2)	2 (2.8)	14 (19.7)	1 (1.4)	71 (100.0)
Cleaning	1 (0.7)	6 (4.0)	20 (13.2)	<b>101 (66.9)</b>	1 (0.7)	4 (2.6)	5 (3.3)	13 (8.6)	151 (100.0)
Devices	13 (4.1)	64 (20.1)	74 (23.3)	<b>125 (39.3)</b>	0 (0)	0 (0)	41 (12.9)	1 (0.3)	318 (100.0)
Education	1 (1.1)	13 (14.6)	16 (18.0)	<b>45 (50.6)</b>	0 (0)	0 (0)	0 (0)	5 (5.6)	89 (100.0)
Hand hygiene	6 (3.6)	<b>57 (33.7)</b>	42 (24.9)	45 (26.6)	0 (0)	0 (0)	0 (0)	5 (3.0)	169 (100.0)
Infection control programme	0 (0)	0 (0)	3 (18.8)	2 (12.5)	0 (0)	0 (0)	0 (0)	0 (0)	16 (100.0)
Implementation	1 (0.9)	25 (22.1)	26 (23.0)	<b>41 (36.3)</b>	0 (0)	0 (0)	0 (0)	4 (3.5)	113 (100.0)
Outbreak	0 (0)	1 (5.0)	1 (5.0)	<b>9 (45.0)</b>	0 (0)	0 (0)	0 (0)	3 (15.0)	20 (100.0)
Patient-focused strategies	0 (0)	2 (8.7)	5 (21.7)	<b>11 (47.8)</b>	2 (8.7)	0 (0)	3 (13.0)	0 (0)	23 (100.0)
Personnel	1 (1.4)	5 (7.1)	7 (10.0)	<b>46 (65.7)</b>	2 (2.9)	3 (4.3)	4 (5.7)	2 (2.9)	70 (100.0)
Reporting	0 (0)	1 (2.9)	5 (14.7)	9 (26.5)	0 (0)	<b>12 (35.3)</b>	0 (0)	7 (20.6)	34 (100.0)
Screening	0 (0)	10 (11.2)	17 (19.1)	<b>39 (43.8)</b>	5 (5.6)	4 (4.5)	14 (15.7)	0 (0)	89 (100.0)
Sharps	0 (0)	1 (4.3)	1 (4.3)	<b>14 (60.9)</b>	0 (0)	1 (4.3)	0 (0)	6 (26.1)	23 (100.0)
Skin antisepsis	2 (4.1)	<b>14 (28.6)</b>	10 (20.4)	9 (18.4)	1 (2.0)	2 (4.1)	11 (22.4)	0 (0)	49 (100.0)
Sterilization	0 (0)	33 (22.1)	27 (18.1)	25 (16.8)	0 (0)	1 (0.7)	3 (2.0)	<b>60 (40.3)</b>	149 (100.0)
Supplies	0 (0)	5 (15.6)	<b>13 (40.6)</b>	6 (18.8)	2 (6.3)	1 (3.1)	4 (12.5)	1 (3.1)	32 (100.0)
Surveillance	0 (0)	4 (8.7)	8 (17.4)	<b>24 (52.2)</b>	3 (6.5)	4 (8.7)	1 (2.2)	2 (4.3)	46 (100.0)
Transmission-based precautions	2 (0.6)	32 (10.2)	65 (20.7)	<b>169 (53.8)</b>	9 (2.9)	13 (4.1)	11 (3.5)	13 (4.1)	314 (100.0)
Vaccination	0 (0)	<b>3 (25.0)</b>	2 (16.7)	1 (8.3)	0 (0)	<b>3 (25.0)</b>	0 (0)	<b>3 (25.0)</b>	12 (100.0)
Ventilation	0 (0)	8 (25.0)	6 (18.8)	<b>17 (53.1)</b>	1 (3.1)	0 (0)	0 (0)	0 (0)	32 (100.0)
Total	28 (1.5)	311 (16.8)	374 (20.2)	769 (41.5)	41 (2.2)	72 (3.9)	134 (7.2)	126 (6.8)	1855 (100.0)

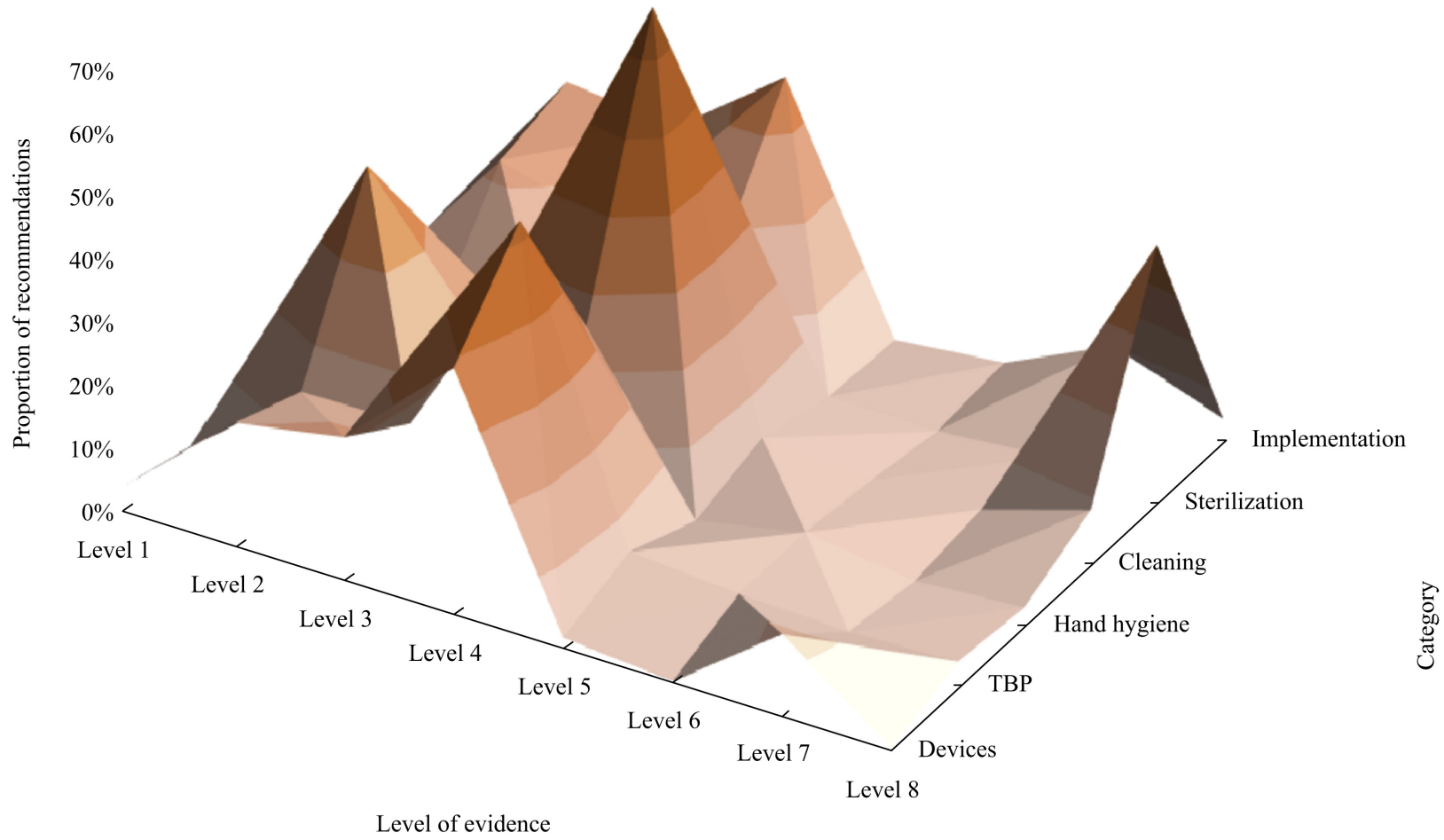
Level 4 – Descriptive studies, expert opinion, low quality evidence

Figures in bold indicate where the highest proportion of recommendations fall for each category.



Category	Grade level N (%)	Grade level							Total	
		Level 3	Level 4	Level 5	Level 6	Level 7	Level 8			
Adherence	Level 5 – Poor/insufficient evidence, very low quality evidence	7 (20.0)	<b>18 (51.4)</b>	1 (2.9)	0 (0)	0 (0)	0 (0)	35 (100.0)		
Antimicrobial prophylaxis		<b>19 (26.8)</b>	13 (18.3)	3 (4.2)	2 (2.8)	14 (19.7)	1 (1.4)	71 (100.0)		
Cleaning		20 (13.2)	<b>101 (66.9)</b>	1 (0.7)	4 (2.6)	5 (3.3)	13 (8.6)	151 (100.0)		
Devices		74 (23.3)	<b>25 (39.3)</b>	0 (0)	0 (0)	41 (12.9)	1 (0.3)	318 (100.0)		
Education		1 (1.1)	13 (14.6)	16 (17.8)	<b>45 (50.6)</b>	2 (2.2)	6 (6.7)	1 (1.1)	5 (5.6)	89 (100.0)
Hand hygiene		1 (1.1)	13 (14.6)	16 (17.8)	<b>45 (50.6)</b>	2 (2.2)	6 (6.7)	1 (1.1)	5 (5.6)	89 (100.0)
Infection control program	Level 6 – Recommended best practice, good practice point	3 (24.9)	45 (26.6)	4 (2.4)	7 (4.1)	3 (1.8)	5 (3.0)	169 (100.0)		
Implementation		3 (18.8)	2 (12.5)	2 (12.5)	1 (6.3)	<b>8 (50.0)</b>	0 (0)	16 (100.0)		
Outbreak		26 (23.0)	<b>41 (36.3)</b>	3 (2.7)	2 (1.8)	11 (9.7)	4 (3.5)	113 (100.0)		
Patient-focused strategies		1 (5.0)	<b>9 (45.0)</b>	0 (0)	6 (30.0)	0 (0)	3 (15.0)	20 (100.0)		
Personnel		5 (21.7)	<b>17 (47.8)</b>	2 (8.7)	0 (0)	3 (13.0)	0 (0)	23 (100.0)		
Reporting		7 (10.7)	<b>46 (65.7)</b>	2 (2.9)	3 (4.3)	4 (5.7)	2 (2.9)	70 (100.0)		
Screening	Level 7 – Unresolved issue, no recommendation	7 (19.1)	<b>39 (43.8)</b>	5 (5.6)	4 (4.5)	14 (15.7)	0 (0)	89 (100.0)		
Sharps		1 (4.3)	<b>14 (60.9)</b>	0 (0)	1 (4.3)	0 (0)	6 (26.1)	23 (100.0)		
Skin antisepsis		10 (20.4)	9 (18.4)	1 (2.0)	2 (4.1)	11 (22.4)	0 (0)	49 (100.0)		
Sterilization		27 (18.1)	25 (16.8)	0 (0)	1 (0.7)	3 (2.0)	<b>60 (40.3)</b>	149 (100.0)		
Supplies		13 (40.6)	6 (18.8)	2 (6.3)	1 (3.1)	4 (12.5)	1 (3.1)	32 (100.0)		
Surveillance		8 (19.5)	<b>24 (52.2)</b>	3 (6.5)	4 (8.7)	1 (2.2)	2 (4.3)	46 (100.0)		
Transmission-based precautions		8 (20.7)	<b>169 (53.8)</b>	9 (2.9)	13 (4.1)	11 (3.5)	13 (4.1)	314 (100.0)		
Vaccination	Level 8 – Legislated requirement	2 (16.7)	1 (8.3)	0 (0)	<b>3 (25.0)</b>	0 (0)	<b>3 (25.0)</b>	12 (100.0)		
Ventilation		6 (18.8)	<b>17 (53.1)</b>	1 (3.1)	0 (0)	0 (0)	0 (0)	32 (100.0)		
Total		374 (20.2)	769 (41.5)	41 (2.2)	72 (3.9)	134 (7.2)	126 (6.8)	1855 (100.0)		

Figures in bold indicate where the highest proportion of recommendations fall for each category.



# Summary

- Majority of IPC categories supported by Level 4
  - Descriptive studies, expert opinion, low quality evidence
- Hand hygiene, skin antiseptics, antimicrobial prophylaxis supported by highest Level 2
  - Well designed RCTs, strong recommendation from high quality evidence
- Lowest level of evidence (7 & 8)
  - reporting, IPC programs, sterilisation

# Summary

- Strength of most IPC guidelines based on low quality evidence
- 60% based on observational studies
- Lack of high quality studies means “strong” recommendations cannot be made

# Limitations

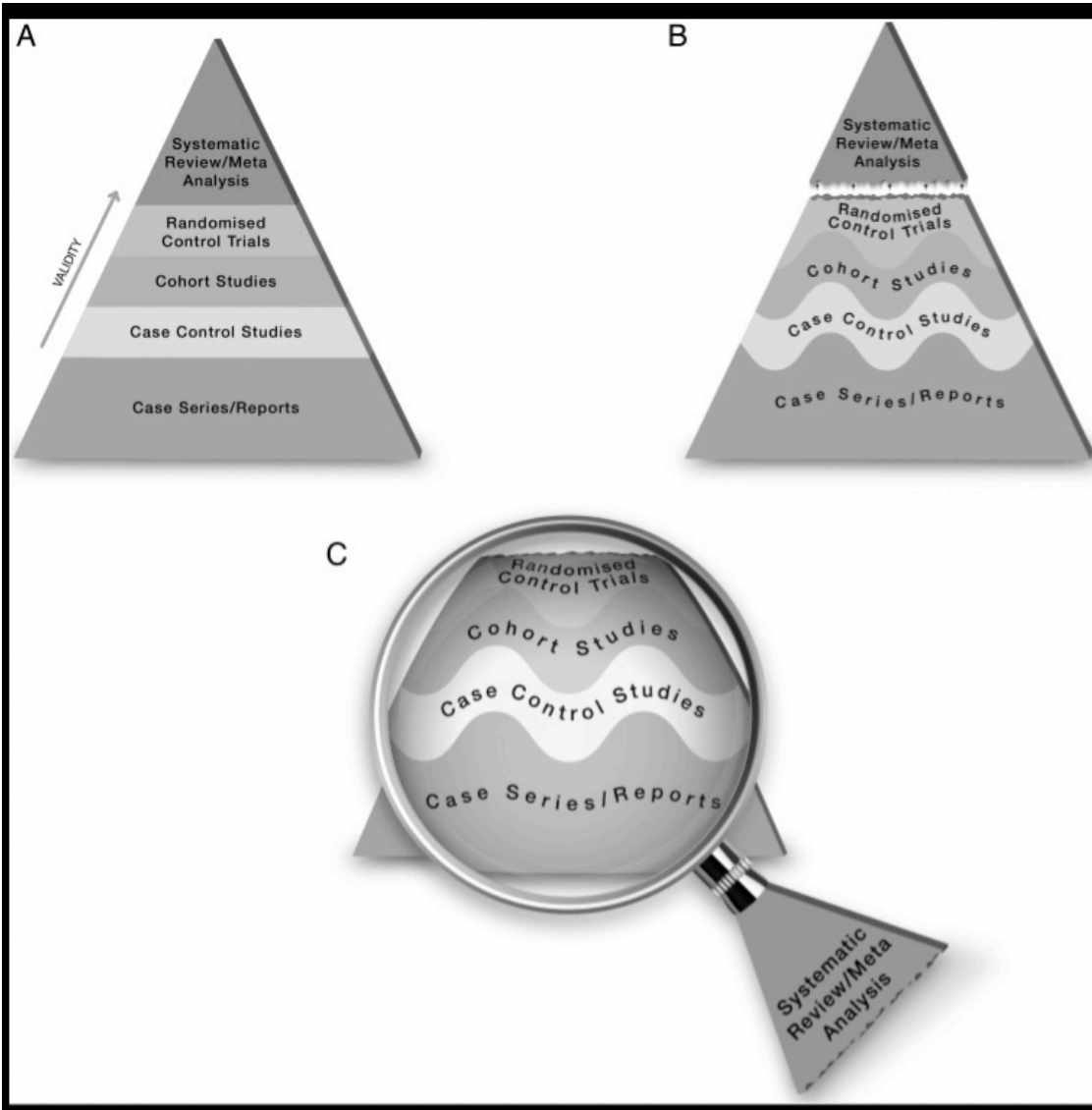
- Limited to past decade
- Inability to review data underpinning the recommendations
- Levels of strength not validated

Strength - inclusion of most commonly used and cited guidelines

# Conclusion

- Vast numbers of guidelines national and international bodies
  - Duplication, confusion and practice variation
- Opportunity for multinational collaboration
- Establish Research priorities





**Figure 1** The proposed new evidence-based medicine pyramid. (A) The traditional pyramid. (B) Revising the pyramid: (1) lines separating the study designs become wavy (Grading of Recommendations Assessment, Development and Evaluation), (2) systematic reviews are 'chopped off' the pyramid. (C) The revised pyramid: systematic reviews are a lens through which evidence is viewed (applied).

Murad, M. Het al (2016).*BMJ Evidence-Based Medicine*, 21(4), 125-127



Podcast



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# Thank you

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November 10, 2022

**SHARING KNOWLEDGE: LEARNING FROM THOSE WHO HAVE CHALLENGED THE CIC**

Speaker: **Jeff Lee**, Canadian Armed Forces Health Services Headquarters

*(FREE Teleclass)*

November 17, 2022

**INFECTION PREVENTION AND CONTROL IN CONFLICT-AFFECTED AREAS**

Speaker: **Prof Wendy J Graham**, London School of Hygiene and Tropical Medicine, UK

**POSTPONED TO 2023**

November 22, 2022

*(European Teleclass)* **SANITATION INTELLIGENCE AND PUBLIC HEALTH**

Speaker: **The Toilet Board Coalition**, Switzerland

*(FREE South Pacific – Broadcast live from the New Zealand Infection Prevention and Control Nurses College conference)*

**UNDERSTANDING THE SCIENCE BEHIND AOTEAROA NEW ZEALAND'S COVID-19 RESPONSE**

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