Effectiveness of interventions to improve the public’s antimicrobial resistance awareness and behaviours associated with prudent use of antimicrobials: a systematic review

How to cite:
Price, Lesley; Gozdzielewska, Lucyna; Young, Mairi; Smith, Fraser; MacDonald, Jennifer; McParland, Joanna; Williams, Lynn; Langridge, Darren; Davis, Mark and Flowers, Paul (2018). Effectiveness of interventions to improve the public’s antimicrobial resistance awareness and behaviours associated with prudent use of antimicrobials: a systematic review. Journal of Antimicrobial Chemotherapy, 73(6) pp. 1464–1478.

For guidance on citations see FAQs.

© 2018 The Authors

https://creativecommons.org/licenses/by-nc-nd/4.0/

Version: [not recorded]

Link(s) to article on publisher’s website:
http://dx.doi.org/doi:10.1093/jac/dky076

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online’s data policy on reuse of materials please consult the policies page.
Effectiveness of interventions to improve the public’s antimicrobial resistance awareness and behaviours associated with prudent use of antimicrobials: a systematic review

How to cite:
Price, Lesley; Gozdzielewska, Lucyna; Young, Mairi; Smith, Fraser; MacDonald, Jennifer; McParland, Joanna; Williams, Lynn; Langridge, Darren; Davis, Mark and Flowers, Paul (2018). Effectiveness of interventions to improve the public’s antimicrobial resistance awareness and behaviours associated with prudent use of antimicrobials: a systematic review. Journal of Antimicrobial Chemotherapy, 73(6) pp. 1464–1478.

For guidance on citations see FAQs.

© 2018 The Authors

https://creativecommons.org/licenses/by-nc-nd/4.0/

Version: Supplementary Material

Link(s) to article on publisher’s website:
http://dx.doi.org/doi:10.1093/jac/dky076

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online’s data policy on reuse of materials please consult the policies page.
## Supplementary Table S1. An example of search strategy applied for MEDLINE database.

### MEDLINE

#### Context

<table>
<thead>
<tr>
<th></th>
<th>Search Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(superbug* OR superinfection*):ti,ab</td>
</tr>
<tr>
<td>2</td>
<td>MH “Superinfection”</td>
</tr>
<tr>
<td>3</td>
<td>(multiresistant OR multiresistance OR &quot;multi-resistant&quot; OR &quot;multi-resistance&quot; OR MDR OR MDRO OR AMR):ti,ab</td>
</tr>
<tr>
<td>4</td>
<td>((drug* OR multidrug OR “multi-drug” OR antimicrobial* OR “anti-microbial*” OR antiinfection* OR “anti-infection*” OR antibacterial* OR “anti-bacterial*” OR antibiotic* OR “anti-biotic*”)) N4 (resistant OR resistance OR tolerant OR tolerance):ti,ab</td>
</tr>
<tr>
<td>5</td>
<td>MH &quot;Drug Resistance&quot;</td>
</tr>
<tr>
<td>6</td>
<td>MH &quot;Drug Resistance, Microbial+&quot;</td>
</tr>
<tr>
<td>7</td>
<td>MH &quot;Drug Resistance, Multiple+&quot;</td>
</tr>
<tr>
<td>8</td>
<td>MH &quot;Drug Tolerance&quot;</td>
</tr>
<tr>
<td>9</td>
<td>(“r factor*” OR “resistant factor*”):ti,ab</td>
</tr>
<tr>
<td>10</td>
<td>MH “R Factors”</td>
</tr>
<tr>
<td>11</td>
<td>((antimicrobial OR “anti-microbial” OR antiinfection OR “anti-infection” OR antibacterial OR “anti-bacterial” OR antibiotic OR “anti-biotic”)) N4 (stewardship):ti,ab</td>
</tr>
<tr>
<td>12</td>
<td>MH &quot;Anti-Infective Agents”</td>
</tr>
<tr>
<td>13</td>
<td>MH &quot;Anti-Bacterial Agents&quot;</td>
</tr>
<tr>
<td>14</td>
<td>OR/1-13</td>
</tr>
</tbody>
</table>

#### Population

<table>
<thead>
<tr>
<th></th>
<th>Search Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>(public OR population OR community OR citizen* OR household* OR resident* OR consumer* OR carer* OR caregiver* OR people OR adult* OR men OR women OR mother* OR father* OR parent* OR student* OR pupil* OR children OR adolescent* OR teenager*):ti,ab</td>
</tr>
<tr>
<td>16</td>
<td>MH “Caregivers”</td>
</tr>
<tr>
<td>17</td>
<td>MH “Men”</td>
</tr>
<tr>
<td>18</td>
<td>MH “Women”</td>
</tr>
</tbody>
</table>
MH “Parents”
MH “Fathers”
MH “Mothers”
MH “Students”
OR/17-22

**Intervention**

(intervention*):ti,ab

(training OR teaching OR education OR program* OR initiative* OR workshop* OR seminar* OR module* OR session* OR curriculum):ti,ab

MH “Teaching”
MH “Teaching Materials”
MH “Education”
MH “Models, Educational”
MH “Health Education”
MH “Education, Nonprofessional”
MH “Curriculum”

((written OR printed OR online OR oral OR disseminat* OR provi*) N2 (information OR advice OR resource* OR material*)):ti,ab

(pamphlet* OR handout* OR poster* OR leaflet* OR newsletter* OR brochure* OR booklet* OR TV OR television OR radio OR marketing OR advertising OR publicity OR campaign* OR “mass media” OR “communication media” OR outreach OR computer* OR Internet OR online OR website* OR “social media” OR “social network*” OR Facebook OR Twitter OR tweet OR blog* OR SMS OR ”short messaging service*” OR text* OR email* OR podcast* OR smartphone* OR ((mobile OR cell OR smart) N1 (phone* OR telephone* OR app* OR application*)):ti,ab

MH “Consumer Health Information”
MH “Health Promotion”
MH “Health Communication”
MH “Persuasive Communication”
MH “Public Health”
MH “Audio Visual Aids”
MH “Manuals as Topic”
MH “Pamphlets”
MH “Advertising as Topic”
MH “Marketing”
MH “Social Marketing”
MH “Mass Media”
MH “Social Networking”
MH “Social Media”
OR/24-48

Outcomes
MH “Program Evaluation”

((behave#r N3 (change* OR changing OR alter* OR modification* OR modify OR modifying OR modifies OR modified)) OR intention*):ti,ab

MH “Motivation”
MH ”Intention"

(attitude* OR belief* OR view* OR opinion* OR expectation* OR ”anticipat* regret” OR knowledge OR awareness OR ”health literacy” OR ”risk perception*” OR ”perceived risk*” OR ”perceived susceptibility” OR ”illness perception*” OR ”treatment perception*”):ti,ab

MH “Attitude to Health”
MH “Health Knowledge, Attitudes, Practice”
MH “Health Literacy”

(“perceived behavio#ral control” OR autonomy OR capacity OR ”self-efficacy” OR competen* OR confidence OR ability OR skill*):ti,ab

MH ”Self Efficacy”

(”perceived norm*” OR ”injunctive norm*” OR ”subjective norm*” OR ”descriptive norm*” OR ”moral norm*” OR ”self-identity”):ti,ab

MH ”Social Norms”

((medication* OR drug* OR antimicrobial* OR ”anti-microbial*” OR antiinfection* OR ”anti-infection*” OR antibacterial* OR ”anti-bacterial*” OR antibiotic* OR ”anti-biotic*”)) N4 (use OR used OR usage OR consumption OR purchas* OR dispos* OR storage OR storing OR sharing OR shared OR expect* OR request*)):ti,ab
((inappropriat* OR irrational OR imprudent OR unnecessar* OR irresponsibl* OR misuse* OR improper* OR mistake* OR indiscriminat* OR suboptimum* OR bad OR overuse* OR excessiv* OR vary OR varied OR variation OR poor OR unsafe*)
N4 (use OR usage OR utili?e OR treatment OR consumption OR purchas* OR dispos* OR storage OR sharing OR shared OR expectation* OR request*)):ti,ab

((appropriat* OR rational OR prudent OR judicious* OR optimal* OR correct OR proper* OR responsibl* OR safe* OR good OR decreas* OR limit* OR curb* OR minimi?e* OR minimal* OR lessen* OR curtail* OR abate* OR restrict* OR lower* OR discontinue* OR delay*) N4 (use OR usage OR utili?e OR treatment OR consumption OR purchas* OR dispos OR storage OR sharing OR shared OR expectation* OR request*)):ti,ab

MH “Drug-Seeking Behavior”

(compliance OR concordance OR adherence):ti,ab

MH “Medication Adherence”

(“self-car*” OR "self-manag*“ OR "self-monitor*“ OR “self-medicat*”):ti,ab

MH "Self Care"

MH "Self Medication"

OR/50-70

Combination of all search strings

AND/14,23,49,71

Limit 72 to year 2000
Supplementary Table S2. Data extraction tool designed for the purpose of the study.

<table>
<thead>
<tr>
<th>Study ID</th>
<th>First author, year of publication</th>
<th>Country</th>
<th>Language</th>
<th>Settings</th>
<th>Aim(s)</th>
<th>Study design</th>
<th>Population</th>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
<th>Sample size (including power calculation &amp; statistical analysis)</th>
<th>Recruitment methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTERVENTION</td>
<td>DATA COLLECTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>----------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention content</td>
<td>Measure to ensure intervention fidelity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparator(s)/control</td>
<td>Theoretical framework employed in intervention design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data collection methods</td>
<td>Validity of tools</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline data collected</td>
<td>Number of data collection points (pre-intervention)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of data collection points (post-intervention)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OUTCOMES</td>
<td>ANALYSIS</td>
<td>FINDINGS/RESULTS</td>
<td>COMMENTS/NOTES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>-----------------</td>
<td>---------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary outcome</td>
<td>Secondary outcome(s)</td>
<td>Statistical analysis</td>
<td>Other analyses</td>
<td>Participants (demographic characteristics)</td>
<td>Findings/results (primary outcomes)</td>
<td>Findings/results (secondary outcomes)</td>
<td>Limitations</td>
<td>Conclusions</td>
<td>Comments/notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Supplementary Table S3. Excluded studies with rationale.

**Design other than RCT, NRT, CBA or NCBA study**


15. McCarthy M. Many US parents have poor understanding of proper antibiotic use, study finds. *BMJ (Online)* 2015; **351**: h4009.


**Participants recruited from HC settings**

1. Alden DL, Tice AD, Berthiaume JT. Investigating approaches to improving appropriate antibiotic use among higher risk ethnic groups. *Hawaii Med J* 2010; **69**: 260-263.


**Context other than AMR**


**Outcomes not related to AMR awareness antimicrobial stewardship**


Other

Conference abstract of already reviewed study

*Full text not available in English/inability to translate*


*Article that refers to already reviewed study*


*Protocol of already reviewed study*


*Majority (74.3%) of respondents were HC professionals*