

## An investigation into the effectiveness of antimicrobial stewardship during a pandemic- COVID-19 in acute care setting

### Citation

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### Review question

1. What strategies have been employed for effective antibiotic utilization/antimicrobial stewardship during pandemics?
2. What challenges have arisen in the use of antibiotics due to pandemics?
3. What antibacterial stewardship strategies have been employed in the acute care setting during the COVID-19 pandemic?
4. What antibacterial stewardship strategies can be adapted for use in acute care settings during pandemics?

### Searches [1 change]

Firstly, rapid reviews in the PROSPERO were conducted for previously accepted systematic reviews, using different search terms that were used to carry out database searches for published articles from 2007 to March 2021. Then, the first search was completed on MEDLINE, using a comprehensive list of search terms, and this search was then amended or modified in the subsequent databases depending on the subject headings and keywords and their synonyms identified in the databases with more relevant and related keywords. A combination of keywords (searching the title and abstract) and index terms, as well as their synonyms where applicable, were used depending on the database. Spelling variations for different search terms were also employed. then search continued using the title field of the following databases: AMED (Allied and Complementary data Medicine); EMBASE; Embase classic; Global Health; HMIC (Health Management Information Consortium); International Pharmaceutical Abstracts; Health and Psychosocial Instruments; PsycEXTRA; PsycINFO; Maternity & Infant Care Database (MIDIRS); PubMed; Scopus; Web of Science; CINAHL PLUS; OpenGrey. References of related publications were searched, and references of the included studies were also searched until no more relevant study could be retrieved.

### Types of study to be included

RCTs, non-randomized trials, CBA studies, interrupted time series designs, case-control studies and cohort studies.

### Condition or domain being studied

This systematic review aims to identify and describe the current evidence base of the effectiveness of antimicrobial stewardship strategies in acute care hospitals during a pandemic- - systematic review of antimicrobials—which have been utilised to ensure the (i) timely review of IV antibiotics; and subsequently (ii) timely IVOST; and (iii) the optimization of the duration of oral and IV antibiotics, it will be conducted at three different baseline times (pre-pandemics, during pandemics, and after the second wave of COVID-19 pandemics).

### Participants/population

COVID19 patients' use of antibiotics.

### Intervention(s), exposure(s)

antimicrobial stewardship/antibiotic stewardship

antimicrobial utilization/use

### Comparator(s)/control

Comparison with a control group/a group that carried out usual care without an AMS intervention; comparison between two or more AMS interventions.

### Context

Inclusion Criteria:

(i) studies targeting the public/patients' use of antibiotics; (ii) studies describe an intervention to improve antibiotic prescribing or AMS or any other stewardship intervention as switch from IV to oral antibiotics, and the duration of IV and oral antibiotics; (iii) studies contain comparison with a control group/a group that carried out usual care without an AMS intervention; comparison between two or more AMS interventions; (iv) studies carried out the AMS interventions in adult inpatient settings and in acute care hospitals; (v) studies include the antibiotic use and utilization such as prescribing, dispensing or administering antibiotics.

Exclusion Criteria:

(i) non-HCPs (patient family or community or nursing or long-term care patients); (ii) studies that are not describe an AMS intervention; (iii) AMS interventions carried out in nursing homes, care homes or long-term healthcare facilities; intervention carried out in the community settings; interventions carried out in a paediatric setting/hospital; interventions carried out in animals/ veterinary practice.

### Main outcome(s)

Primary outcomes: review of the effectiveness of AMS intervention and strategies pre-pandemics, during, and after the pandemics

### Measures of effect

Measure the odd ratios

### Additional outcome(s) [1 change]

Secondary outcomes: HCPs' knowledge, attitudes or behaviours related to prescribing; rates of AMR; length of stay in hospitals; mortality or other relevant clinically related outcomes or unintended outcomes; COVID-19 pandemics impact on AMS intervention.

### Measures of effect

Measure the effective strategies for antimicrobial stewardship implementation in the acute settings and the effectiveness of AMS in the pandemics-COVID-19.

### Data extraction (selection and coding) [1 change]

#### Data extraction (selection and coding)

Studies were selected after removing the duplicates, screening the titles and abstracts, and applying the inclusion and exclusion criteria on eligible full texts. The screening process was completed by two reviewers independently. The screening results of the two reviewers were compared and disagreements were resolved by discussions among the two reviewers.

Data extraction sheet was developed. One reviewer will conduct the data extraction process and a second reviewer will verify the accuracy of the process by independently conducting the extraction on a number of the selected studies. Discrepancies will be resolved by discussions with the second reviewer and the rest of team members.

#### Risk of bias (quality) assessment

The screening process was completed by two reviewers independently. Discrepancies were resolved by discussion. The review will be revised and edited by another researcher. The risk of bias will be explored by analysing the quality of the included studies. Full text studies that have a qualitative, quantitative or a mixed method nature will be evaluated using the Mixed Method Appraisal Tools for systematic reviews (Hong et al., 2018). To evaluate the trustworthiness of grey literature, if applicable, the AACODS (Authority, Accuracy, Coverage, Objectivity, Date; Significant) check list will be utilised (Tyndall, 2010).

The identified studies so far were of different settings, community, participants and targeted patient groups. Moreover, data from grey literature were not excluded and studies of only English abstracts will only be included. Thus, an attempt to quantitatively pool the results of the studies was not feasible.

Additionally, use the Critical Appraisal Skills Programme (CASP) to grade the overall strength of the evidence as high, moderate, low, or insufficient. An in-depth quality analysis was impractical because of the heterogeneity of the study designs.

#### Risk of bias (quality) assessment

Three tools, selected based on the design of each study, will be used for quality appraisal and risk-of-bias assessment. The National Heart, Lung and Blood Institute quality assessment tools<sup>19</sup> were used to appraise the quality of before–after (pre–post) studies with no control group, and observational cohort studies. The PRISMA Critical Appraisal Checklist will be used to appraise the quality of studies. These studies were labelled either ‘good’, ‘fair’ or ‘poor’ at the stage of quality appraisal. For randomized controlled trials (RCTs) and controlled before–after (CBA) studies, risk of bias was assessed using the Cochrane EPOC-suggested ‘risk of bias’ criteria.

Quality appraisal and risk-of-bias assessment will be reviewed independently to assess the quality of the study selections. Minor discrepancies in risk-of-bias assessment/quality appraisal will be recorded, indicating rigour in assessment; these minor discrepancies will be resolved via online discussion. Studies will be excluded based on their quality because all included studies will be selected to meet the objectives of the review.

#### Strategy for data synthesis [1 change]

##### Strategy for data synthesis

The identified studies so far were of different settings, community, participants and targeted patient groups. Moreover, data from grey literature were not excluded and studies of only English abstracts will only be included. Thus, an attempt to quantitatively pool the results of the studies was not feasible.

Narrative synthesis as described by the Economic and Social Research Council (ESRC) will be undertaken (Popay et al.,

2006). The first step “developing a theory” is optional and was not relevant to the purpose of this review (Popay et al., 2006). The second step is to produce a preliminary synthesis. At this stage, a combination of tools will be used to produce a comprehensive description of the studies compared to using one tool (Evans, 2002; Popay et al., 2006). Tabulation will initially be used in this review to develop an initial description that eases the process of comparing the studies for the reader (Evans, 2002; Popay et al., 2006). This will be followed by thematic analysis of the result sections of the included studies based on a guidance developed by Braun and Clarke (2006). The third step in this synthesis is to explore relationships within and across studies, in which concept mapping will be utilised. In the fourth and final step of this narrative approach, critical reflection of the synthesis process was undertaken (Popay, et al., 2006).

#### Analysis of subgroups or subsets

Based on the sufficiency of the available data, subgroup analysis might be undertaken based on the clinical practice, the type of medication or the type medication risk-related communication involved.

#### Analysis of subgroups or subsets

Using data collection sheet. Statistical analysis and data will be analysed with IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA)

#### Contact details for further information

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#### Organisational affiliation of the review [1 change]

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#### Type and method of review [1 change]

Narrative synthesis, Systematic review

#### Anticipated or actual start date

25 February 2021

#### Anticipated completion date [1 change]

28 July 2022

### Funding sources/sponsors [1 change]

This review is funded by Rasha Elshenawy - self-funded - as part of the PhD research thesis for the investigation into the effectiveness of Antimicrobial Stewardship during a pandemic - COVID-19 in acute care setting in the University of Hertfordshire - United Kingdom

### Conflicts of interest

### Language

English

### Country

England

### Stage of review [2 changes]

Review Completed published

### Details of final report/publication(s) or preprints if available [1 change]

<https://www.researchsquare.com/article/rs-1947571/v1>

<https://bmcpublikealth.biomedcentral.com/articles/10.1186/s12889-023-15072-5>

### Subject index terms status

Subject indexing assigned by CRD

### Subject index terms

Antimicrobial Stewardship; COVID-19; Critical Care; Humans; Pandemics; SARS-CoV-2

### Date of registration in PROSPERO

15 March 2021

### Date of first submission

12 March 2021

### Stage of review at time of this submission [1 change]

Stage	Started	Completed
Preliminary searches	Yes	Yes
Piloting of the study selection process	Yes	Yes
Formal screening of search results against eligibility criteria	Yes	Yes
Data extraction	Yes	Yes
Risk of bias (quality) assessment	Yes	Yes
Data analysis	Yes	Yes

### Revision note

I updated this record because the systematic review has been completed and published in the PMC Public Health Journal. Here is the link to the systematic review <https://www.researchsquare.com/article/rs-1947571/v1>

*The record owner confirms that the information they have supplied for this submission is accurate and complete and they understand that deliberate provision of inaccurate information or omission of data may be construed as scientific misconduct.*

*The record owner confirms that they will update the status of the review when it is completed and will add publication details in due course.*

### Versions

15 March 2021

02 July 2021

10 March 2023