Author’s response to reviews

Title: Mapping educational opportunities for healthcare workers on antimicrobial resistance and stewardship around the world

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Author’s response to reviews:

Reviewer #1:

This is a very useful and timely review of the resources to support global AMR and stewardship activity. It is well written and the data presented appropriately. The conclusions are very important and should support future policy and action. I have some specific queries/comments which I hope the authors will be able to address and find helpful.

1. Methods: the search should have included antimicrobial stewardship as well as antibiotic as these terms [often wrongly ] are used interchangeably. The AMR is a very broad term and may have brought up a lot of material in relation to infection prevention/control- the authors do not mention or distinguish here.

• Thanks for flagging this – the text presents a non-exhaustive list of search terms, and we did in fact search for both “antimicrobial stewardship” and “antibiotic stewardship.” We have amended the text for clarity.

2. Methods: the data collected concentrated on program type, country, region and target audience. It would have been helpful to know language [assume all English/French-translation available ?], cost or free to access, whether it was certified or had CPD credit, if there was any assessment and if there was any impact metrics for any of the courses?

• We conducted all our searching in English and French, and have now clarified in the text that we did not translate articles from other languages.
In the text of the table, we also identified online and in-person courses that were free of charge. We noted whether it was certified or had CPD credit where the original source mentioned this. We have added symbols to identify programs that were free of charge and programs that provided CPD credit, a certificate, or counted towards a degree program.

Unfortunately, based on the data available we were very rarely able to tell if there were assessment or impact metrics. Although we feel very strongly that planning assessment measures is an important aspect any new educational programs, we feel that it was beyond the scope of this mapping exercise.

3. Results? It would be visually compelling if there is a map showing the disparity of resource by country / continent

4. Results: the figures are not annotated in their pages
   - We have updated the figure titles and ensured that each figure is mentioned in the text.

5. Is there any information about sustainability of the courses- some seem "one off" while others are more sustained- there is little information about how accessible and up to date the material is, particularly in relation to the web based resource. Furthermore, we have not information in the comments if the material presented may or if there are relevant to different geographies and healthcare systems.
   - We agree with the reviewer that finding this information was a challenge. We have added the following text to our limitations section:
   - “We identified many courses through course advertisements posted to the web, however the limitations of our search strategy make it likely that we mainly identified recent courses. Further, for most courses we cannot comment as to whether the course content has been archived on the web. While much of the content from a larger course, such as a MOOC, is likely to remain on the web, it is unlikely that the course content of shorter, in-person courses will be retained in the same way.”
6. Discussion is good, well structured, appreciation of limitations and the key messages are well considered and articulated. Perhaps a stronger voicing of the needs for accreditation, support and steer from governmental bodies about the quality and value of key programs, the need for a dedicated overseeing platform for such educational resource would be hugely beneficial along the lines of support provided by WHO for example to surveillance systems and finally, a push towards recommending a broad undergraduate curriculum with competencies.

♣ We have added an additional sentence to the conclusion to make this point stronger

♣ “National and international actors should advocate for increased accreditation, the creation of a series of competencies for undergraduate curricula, and support resource sharing platforms.”

Reviewer #2:
This is a well written and very timely manuscript reviewing the availability of AMR and AMS education resources worldwide. The results of the authors work highlights an international need for AMS and AMR education that is reliable, freely available and up-to-date.

Whilst not the primary intention of this article, should there be a comment relating to social media and it's role in AMS and AMR education (or perhaps a comment that it is outside the scope of this manuscript)? Goff et al. address social media in Pharmacotherapy 17 May 2012. Additionally Goff et al discuss available AMS education tools from five countries in Lancet ID Feb 2017.

♣ Thanks for noting this, we have added additional text as follows

♣ “We included mobile apps specific to antibiotic resistance if they were identified by experts or identified in web searches. However, it was beyond the scope of the study to search within existing medical apps to locate AMR/AMS content; this has been done elsewhere by Goff et al.”

As stated in the limitations, this manuscript is very heavily focused on the Americas and Europe. Australia was very underrepresented with a single initiative (#82). There are additional sites that would be valuable to include if a minor revision was to be undertaken: The Australian Commission for Safety and Quality in Healthcare (https://www.safetyandquality.gov.au/our-work/clinical-care-standards/antimicrobial-stewardship-clinical-care-standard/), Clinical Excellence Commission (http://www.cec.health.nsw.gov.au/patient-safety-programs/medication-
safety/antimicrobial-stewardship/quah) and the National Centre for Antimicrobial Stewardship (https://www.ncas-australia.org/)

♦ Thank you for point out these resources. We have updated our findings to include these three additional Australian initiatives and updated our charts and graphs to match.

Page 3, lines 18 to 23 - should this statement about the inappropriate prescribing of antibiotics for conditions such as viral infections be referenced?

♦ Thanks for flagging this – we have added the necessary citations.

- Reviewer #3:

Marginal interest article: an incomplete list of world initiatives against AMR

• We appreciate the reviewer taking the time to read our paper. We don’t feel that this article is of minor importance – rather, we agree with Reviewer 1 who noted “The conclusions are very important and should support future policy and action.” This paper was commissioned by WHO and fills a gap in the literature on health workforce education that the WHO urgently wanted to address. By mapping and identifying gaps in the available resources, we have provided a starting point for future efforts to train healthcare workers on AMR/AMS.