Using a decision aid to facilitate antibiotic use after a delayed prescription

Report on the peer mentoring project for the health psychology section of the DGPs

Antimicrobial resistance (AMR) is an urgent problem for global health. The World Health Organization (WHO) lists AMR as one of the top 10 threats to global public health (WHO, 2019). One central cause for this development is the overuse and misuse of antimicrobials in primary care – mainly because of inappropriate prescribing by the physician (Smieszek et al., 2018). Doctors often prescribe antibiotics to fulfil patient expectations (Sirota et al., 2017) but patients often lack the full understanding of appropriate antibiotic use. Many patients believe antibiotics to be effective against viral infections (Gualano et al., 2015) and additionally lack the knowledge of the negative consequences of antibiotic overuse (Thorpe et al., 2020).

To address the further development of antimicrobial resistance, last year an interdisciplinary network of behavioral scientists formed. The “ABC Network” (Antimicrobials: Behaviour & Cognition Network) has the goal to bring scientists together to raise awareness about this global health threat and to promote and conduct more research on human behavior in the context of AMR. We, Elisabeth Sievert and Marina Gross, were both invited to join the network and decided to combine both of our research interests in health behavior to plan a study together. Elisabeth Sievert already had experience in research regarding AMR and Marina Gross had insights in health decision making and information seeking behavior. Combining both of our interests, we came up with the idea to study patient’s engagement with health information in the context of antibiotic prescriptions.

One intervention that is applied in primary care to prevent antibiotic overuse is the concept of delayed prescriptions: The doctor informs the patient that it is yet unclear, whether the use of antibiotics is necessary in their case. The patient receives a prescription but is told to wait for some days to monitor the development of their infection. If the symptoms do not improve or even worsen over a specified time, the patient can fill the prescription for antibiotic treatment. Delayed prescriptions have been shown to significantly reduce antibiotic use in comparison with direct antibiotic prescriptions (Spurling et al., 2017). Still, many patients fill the prescriptions without any delay (Francis et al., 2012).
For our study we wanted to find a way to support patients during the time of the delay. In a first pilot survey, we found that participants expressed the wish to get more information in the delayed prescription period. We therefore decided to develop a decision aid to address uncertainty in the waiting period and to facilitate the patient’s decision-making whether and when to take the antibiotics. Our research goal was to find out if decision aids can be applied in the waiting time of delayed prescription to reduce the overuse of antibiotics while also improving patient’s satisfaction with their decision and giving them a feeling of autonomy in this uncertain situation. To test this, we planned to apply the delayed prescription game, a paradigm developed by Ana Santana (Santana et al., 2024) to study delayed prescribing and antibiotic use with behavior-contingent incentives. In this paradigm, the participants encounter a fictitious situation in which they fall ill with an infection and consult a doctor for it. Because of diagnostic uncertainty, the doctor gives a delayed prescription. Over the course of ten game rounds, the participants receive information about symptoms of their infection that may indicate a bacterial or a viral infection. In each round, they can decide to take the antibiotics. Essentially, over the course of the game rounds, the participants try to infer whether they have a bacterial infection or a viral infection. Only in the case of a bacterial infection, the antibiotics would be effective in treating the symptoms and thus preventing the participants to lose points in the game situation. If participants are part of the viral infection group, the antibiotics will not be effective and thus they should decide against using them. As an outcome, we can then analyze if and when they will decide to take antibiotics. To integrate our intervention into this game paradigm, the participants were “given” the decision aid during the fictitious consultation with the doctor and were able to look at the decision aid in each round of the delayed prescription game. As we were only interested in whether the decision aid will help patients delay the antibiotic intake when it is unnecessary (when the infection is viral), we only included the viral infection condition in our study.

We were very excited and thankful, when we received the peer-mentoring scholarship by the DGPs which gave us the chance to work together and conduct our study. To gather more feedback before starting with the data collection, we presented our idea during the workshop hosted by the ABC network. There we met a representative of the WHO, who was currently working on an information leaflet that doctors could hand out to patients as an alternative to
directly prescribing antibiotics. Because our ideas and goals aligned so well, we decided for a cooperation with the WHO on this project and integrated their work on the information leaflet into our design for the decision aid. Our aim is to infer from our decision aid study the effectiveness and possibilities for the information leaflet and in the future cooperate on a field study, testing it in primary care practices. From guidelines for designing effective decision aids for medical decision making, we designed two additions to the primarily informational leaflet provided by the WHO: In the value condition, we included questions that should elicit participants values. The answers to these questions are not used as an outcome in our study as their purpose is to help participants think about their own values regarding antibiotics and AMR. In the monitoring condition, we added a fictional calendar for the course of the ten game rounds, that the participants could use to note their symptoms and whether they were indicative of a viral or bacterial disease. This was meant to help them monitor their own symptoms and to easier find out if they have a viral or bacterial disease in the game. Eventually, in our study, we tested five experimental conditions: 1) control condition without any additional information, 2) information condition, which included the leaflet by the WHO, 3) value condition, including the value questions, 4) monitoring condition, including the symptom calendar, and 5) value + monitoring condition, which combined the two additional interventions. All intervention conditions (excluding the control condition) included the WHO information leaflet.

The results of our study showed reduced antibiotic use in all intervention conditions compared to control ($F(1) = 10.43$, $p = 0.001$, $d = 0.318$). The figure on the next page shows the number of rounds in which antibiotics were used by the participants, showing significantly lower numbers in all intervention conditions compared to control. However, there was no significant difference between the intervention conditions, showing that the purely informational leaflet reduced the antibiotic use in the game. Additionally, we were able to show that the participant’s satisfaction with the decision ($F(1) = 12.47$, $p = 0.0004$, $d = 0.348$) as well as the feeling of decisional support ($F(1) = 21.6$, $p < 0.0001$, $d = 0.458$) was significantly higher in all intervention conditions compared to control. This is in line with the initial pilot study, that suggested participants wish for more information and support in the delay after the prescription by the doctor.
Our results show promise in helping patients in a situation of delayed prescription. We were able to experimentally confirm the effectiveness of the WHO leaflet as a purely informational intervention which can be easily distributed during a consultation with the doctor. We hope to further support the WHO in their application of the leaflet intervention and maybe add field data to our experimental approach in testing this decision aid.

We will present our findings of this project on the second ABC network workshop this summer, as well as on the EHPS 2024 conference in September. Additionally, we provide the WHO with the informational poster (see attachment) we created to facilitate the communication of our results with policy makers. After feedback from the WHO in the upcoming ABC workshop, we will decide whether to publish our present findings as a stand-alone paper, or whether to include field data in cooperation with the WHO.

**Antibiotic use in the treatment conditions**

(Figure shows rounds of antibiotic intake as a continuous measure of antibiotic use in the game. Violin plots show mean and 95% confidence intervals.)
References


https://doi.org/10.1002/14651858.CD004417.PUB5/MEDIA/CDSR/CD004417/IMAGE_N/NC004417-CMP-007.01.SVG


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Using a decision aid to facilitate prudent antibiotic use after a delayed prescription

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What is the problem?

Overuse and misuse of antibiotics in primary care contribute to the development of antimicrobial resistance (AMR). Delayed prescriptions (advising patients to wait and monitor their symptoms before taking antibiotics) are associated with a significant reduction in antibiotic use (Little et al., 2014; Spurling & Askew, 2017). But, instead of waiting, many patients take antibiotics the same day they are handed the delayed description, which undermines its efficiency (Lior et al., 2022). Recent research has been able to identify several potential mechanisms, such as the tendency to prefer immediate action (Sargent et al., 2017) and immediate relief of symptoms (Langford et al., 2020) over the long-term consequences of antibiotic resistance, and experiences of uncertainty during the delayed prescription period (Santana et al., 2024). Therefore, we tested the effectiveness of a decision aid leaflet developed by the WHO to facilitate prudent antibiotic use following delayed prescriptions. The leaflet was designed to introduce an "antibiotic-free prescription," informing the patient about their symptoms and possible treatment options that are available in their own home. In addition, it explains how antibiotics work, advantages and possible harms of antibiotics and the mechanism of AMR. It also gives specific symptoms to look out for, in which case a doctor should be contacted again. The WHO leaflet can be downloaded via the QR-Code in Figure 1.

What did we do?

We exposed 663 adults from the UK (50% female, M_age = 40) in an experimental survey to a hypothetical scenario that models the use of delayed antibiotic prescriptions and added two methods from the decision aid literature (separately and combined) to test whether this could increase the leaflet’s effectiveness.

Outcome 1: Antibiotic use in hypothetical decision task (Santana et al., 2024)
Outcome 2: Decisional conflict (Decisional-Conflict Scale, O’Connor, 1995)

We did not find:

• People used fewer antibiotics and experienced less decisional conflict in the hypothetical scenario when they received a decision aid along the delayed prescription (Groups 2-5) versus when they did not (Group 1)

• People who received the decision aid plus both symptom monitoring and value assessment (Group 5) used fewer antibiotics than people who only received one psychological intervention (Group 3 and 4), but there was no meaningful difference between the interventions to the leaflet alone.

Implications:

• The decision aid leaflet developed by the WHO reduced antibiotic use in a hypothetical decision task. The psychological interventions provide little additional value. It is necessary to test the effectiveness of the decision aid in a field experiment.

• Decision aids can contribute to a more informed and responsible approach to antibiotic use by providing relevant information and tools.

References:
https://doi.org/10.1002/14651858.CD004417.pub5

Figure 1: WHO Decision Aid Leaflet

Figure 2: Symptom monitoring

Please enter your symptom of today, and which type of infection this symptom indicates. This is your daily symptom calendar. Here you can monitor your infection and type in your symptoms and the type of infection that this symptom indicates. (e.g. symptom today: 'Sore throat', disease type: ‘Viral’).

Table: Symptom Monitoring

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Figure 3: Value assessment

It is your decision. What are your values and goals?

I don’t want to take antibiotics unnecessarily. Strongly disagree Strongly agree

I want to explore alternative treatment options before considering the use of antibiotics. Strongly disagree Strongly agree

I am concerned about the side effects and risks associated with taking antibiotics. Strongly disagree Strongly agree

Antibiotic resistance poses a threat to my own and other’s health. Strongly disagree Strongly agree

Antibiotic Use

Note: Bar plots and 95% confidence intervals of mean antibiotic use across groups. Higher scores indicate higher antibiotic use.

Decisional Conflict

Note: Bar plots and 95% confidence intervals of decisional conflict across groups. Higher scores indicate higher decisional conflict.