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Development of tools to implement shared decision-making for guideline-recommended antibiotic prescriptions in primary healthcare physician practices in Switzerland

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EXECUTIVE SUMMARY

The aim of the research project was to promote shared decision-making for antibiotic treatment for three common self-limiting health conditions, namely otitis media acuta (AOM) for children over 6 months, lower urinary tract infection in women aged 16 to 65 (UTI) and tonsillopharyngitis (TP). The objectives were to develop appropriate evidence-based information for QC work and communication tools for primary care physicians (PCPs) to stimulate shared decision-making in consultations when choosing between antibiotic prescription or symptomatic treatment.

The material developed may facilitate knowledge transfer between PCPs and patients about the benefits and harms of antibiotics, and help patients express their values and make informed decisions about their preferred treatment. The underlying concept is that PCPs and their patients have to be confident about treatment choices. If PCPs come to understand patient expectations and preferences, they will lower their prescription rates, because informed patients develop a critical attitude towards antibiotics.

We conducted a total of four Plan-Do-Study-Act (PDSA) cycles to develop three Evidence Based Summary Information sheets (EBSI), three associated Shared Decision-Making Instruments (SDMI) and a questionnaire to introduce the topic among PCPs. We used a participatory approach involving 6 experts, 11 patients and 39 PCPs. The PDSA cycles helped us develop and improve the tools: in the first, we studied the literature and asked for expert feedback; in the second and third, 39 PCPs in three QC groups provided feedback in two consecutive QC sessions, whilst at the same time we interviewed 11 patients; in the fourth, we gathered expert feedback from infectiologists, professional organisations and the Swiss Patient Safety Foundation to confirm the documents.

We created a questionnaire to capture the knowledge PCPs have about the three infections and their attitude towards antibiotic prescriptions for these conditions. PCPs' responses and the discussions in the various QCs revealed that PCPs tend to prescribe antibiotics for AOM, UTI and TP to shorten the duration of symptoms and to avoid complications. They use diagnostic measures like urine dipstick

tests to establish a diagnosis, even though a carefully taken patient history may be sufficient. Taking part in QCs and discussing the EBSIs seemed to increase knowledge about the epidemiology, clinical course, diagnostic and therapeutic measures in the three infections. Notably, PCPs estimated treatment effects, concomitant symptoms with and without antibiotic treatment, and complication rates more realistically after the QC process. Interview data showed that patients appreciate being involved in decision-making and use of the SDMI.

To implement the tools in daily practice, data from QC sessions showed, in line with the literature, that PCPs need to be confident about the EBSI and they need to practice communication skills in the safe environment of a QC to become familiar with the process of shared decision-making.

INTRODUCTION

Antibiotic resistance is a well-documented threat to worldwide public health. Reducing antibiotic prescribing in primary healthcare can effectively reduce the rate of antibiotic resistance [1-4]. This resistance builds up in a society with increased antibiotic misuse and overuse. One reason for overuse is prescription in viral or self-limiting bacterial infections, where antibiotics are ineffective or unnecessary. A reason for these prescriptions can be found in a patient's preference for receiving antibiotics or, more often, the physician's perception of the patient's preference for antibiotics [5-8]. Overuse can be reduced, especially in non-emergency primary care, where a non-antibiotic treatment for mild infections can be as effective for the patient as antibiotic treatment.

In Switzerland, primary healthcare physicians (PCPs) prescribe antibiotics more fastidiously than those in other countries [9-11]. However, they still overtreat some common, often viral, or self-limiting bacterial infections with antibiotics [12]. In November 2016, within the national strategy on antimicrobial resistance (StAR), the Federal Office of Public Health (FOPH) approached the Swiss Society of Infectious Diseases to develop Swiss infectious disease guidelines for the use of antibiotics (www.guidelines.ch). Analysis of the use of the guidelines showed that they were not being implemented and that many PCPs were unaware of them. In addition, providing PCPs with guidelines and with additional physician-performance feedback might be insufficient to effectively reduce antibiotic prescription [13].

Some innovative and effective solutions have been tested in other European countries. One of these is that PCPs involve patients in the decision-making process when prescribing antibiotics, by addressing patient expectations and preferences as to their use. Shared decision-making (SDM) may increase the ability of PCPs to understand their patients' preferences whilst lowering antibiotic prescription rates [14-18].

Patient decision aids (PDA) are tools developed to help patients make shared decisions about various possible health care options. The aim is to promote discussion between patients and health care

providers about these options [19]. PDAs provide patients with relevant information, improve knowledge, and encourage patient involvement in decision-making. They provide structured guidance in the steps of decision-making and facilitate patients in making an informed, value-based decision with their PCPs [20-22].

To involve patients in antibiotic prescription decisions, PCPs first need to gain knowledge about their true effectiveness. They should know of the possible dangers associated with treatment decisions and be able to compare health outcomes with and without treatment. PCPs need to be knowledgeable when they involve their patients in prescribing decisions, considering both their values and preferences [23]. Simple evidence-based summaries and prescription patterns discussed in quality circles (QCs) seem to improve PCP understanding of the true risks and benefits of antibiotic prescriptions and reduce the amount of prescribed medication and diagnostic testing [13, 24-27]. QCs are a multifaceted, step-based intervention for quality improvement in primary healthcare that have gained international attraction because they may foster long-lasting behaviour change. In Switzerland, 80% of all PCPs regularly take part in QCs [28]. PCPs currently lack tools such as summaries of evidence-based information on self-limiting infections or PDAs that help them and their patients to understand the possible benefits and harms of different treatment decisions.

The aim of the research project was to promote shared decision-making for antibiotic treatment for three common self-limiting health conditions, namely otitis media acuta (AOM), lower urinary tract infection in women between 16 and 65 years of age with no relevant pre-existing illness (UTI) and tonsillopharyngitis (TP), as these infections account for approximately 25% of antibiotic prescriptions in ambulatory care [11, 12, 29]. The objectives were to develop appropriate evidence-based information for QC work and communication tools for PCPs to stimulate shared decision-making during consultations when choosing between antibiotic prescription or the wait and see approach. The material developed should facilitate knowledge transfer on the benefits and harms of antibiotics from physicians to patients, and help patients express their personal preferences and values concerning

treatment options. When developing these tools, we applied a participatory approach with front-line PCPs and their patients, informed by evidence from the literature and experts.

METHODS

RATIONALE

In collaborative, participative research, communities and policy-makers actively engage in the research process [30, 31]. They identify together the problems that need to be addressed and define the questions that need to be answered, and then interpret the results and judge their significance for future change. Participatory research is a paradigm that encompasses the whole process of research, from planning to implementation [32]. In this case, we included co-learning and mutual learning in a respectful partnership that strengthened as we came together to analyse and reanalyse the tools that we gradually developed. Participatory research is empowering and increases the competence of participants [33], allowing them to contribute with their insight and understanding, at the same time as facilitating future dissemination of the findings. We involved infectiologists, PCPs, experts in shared decision-making, patients, members of the patient safety foundation and professional associations such as the Swiss Society of General Internal Medicine and Paediatrics.

A literature review suggests QCs may improve individual and group performance by reducing costs, encouraging professionals to order fewer but more appropriate tests, improving prescription habits, and reporting critical incidents. QCs help participants link evidence to everyday practice, deal with uncertainty and feel secure in their professional roles [34] . We decided to use QCs as a means for continuous medical education (CME) and continuous professional development (CPD) concerning knowledge about self-limiting bacterial diseases and skills in SDM, at the same time as giving the participating PCPs the opportunity to improve the emerging tools, those being evidence-based summary information (EBSI) and PDA.

PDAs usually provide structured guidance in the steps of decision-making and enable patients to make an informed, values-based decision with their PCPs. According to the guidelines, they should satisfy procedural, ethical-legal, formal and technical criteria, as well as content criteria [20-22]. The content

criteria require detailed information about the disease, starting with a general introduction to the topic, diagnostic and therapeutic measures and how the decision-making process should take place.

Given the fact that each patient has her own personal characteristics and associated needs during time restricted consultations, we chose to design a tool that encourages and supports the conversation between patients and their PCPs [22]. We therefore decided to develop a tool for the context of a consultation. As this tool does not fulfil all necessary PDA criteria, we refer to the tool as a Shared Decision-Making Instrument (SDMI)[35, 36].

The underlying concept is, that if PCPs involve patients in the decision-making process when prescribing antibiotics, they will come to understand patient expectations and preferences whilst lowering their prescription rates, because informed patients develop a critical attitude towards antibiotics [15-18].

DESCRIPTION OF THE PROCESS

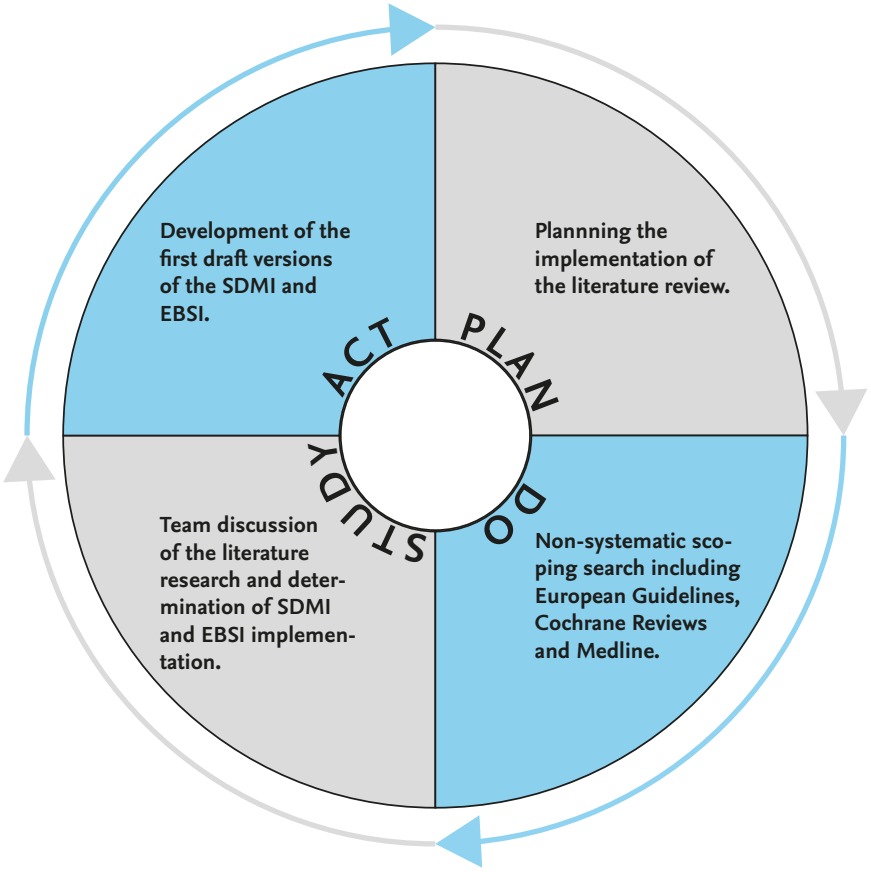
A research team of four people at the Institute of Primary Health Care in Bern (BIHAM) conducted the project and development of the tools. To engage patients in the process, we recruited BM, an expert on patient interviews from BIHAM. We used qualitative data to develop and adapt the EBSI and SDMI during four Plan-Do-Study-Act (PDSA) cycles, starting with a first version of the tools, based on a literature review. We then gathered feedback from experts, allowed PCPs in three different QCs to work on the tools and improve them during two PDSA cycles, at the same time as collecting patient feedback. After this, we gathered further expert opinions on the revised version. We assessed PCP attitudes and ideas when diagnosing and treating patients for AOM, UTI and TP using questionnaires that contributed with quantitative data. The main purpose of the questionnaire is to stimulate QC participants to reflect on and improve their standard practice (supplementary file 1).

PDSA CYCLE I

From September to December 2020, we conducted the first PDSA cycle by performing a literature review (see Figure 1). We focused on AOM, UTI (bladder infection in non-pregnant women older

than 16 and younger than 65 years of age with no relevant pre-existing illness) and TP which cover the most common self-limiting infections in ambulatory care in Switzerland. We wanted to collect evidence-based information, analyse existing guidelines in Europe and find existing PDAs for these infections. We planned and conducted the literature review based on a non-systematic scoping search, including European Guidelines, Cochrane Reviews and Medline. We focused on evidence on the symptoms, diagnosis, natural course of the infection and treatment effects, as well as red flags that could indicate danger and therefore the need for special attention in pre-defined clinical situations.

Figure 1: PDSA Cycle I



DH, TS, and AR, conducted the literature review independently and we presented, assessed, and discussed the literature we found in follow-up meetings. We found several similar and consistent clinical guidelines concerning the treatment of AOM and TP as well as existing PDAs. However, it was difficult to find established clinical guidelines and corresponding PDAs that allowed us to propose the first version of the EBSI and SDMI documents on UTI.

Bakhit et al. (2018) provided evidence-based information about aetiology and treatment options for AOM, and a PDA covering the advantages and disadvantages of different treatment options, such as antibiotics vs. no antibiotics [16]. The layout was user-friendly and easy to understand, so we contacted the authors of the PDA and requested permission to use it as a base for our SDMI. We cross-checked effectiveness and complication rate for different treatment options in various studies.

For TP we chose the PDA from Légare et al.(2012) as it includes a score for clinical assessment (McIsaac-Score), treatment effectiveness, complication rate and red flags [37]. We contacted the authors of the PDA and requested permission to use it as a base for our SDMI.

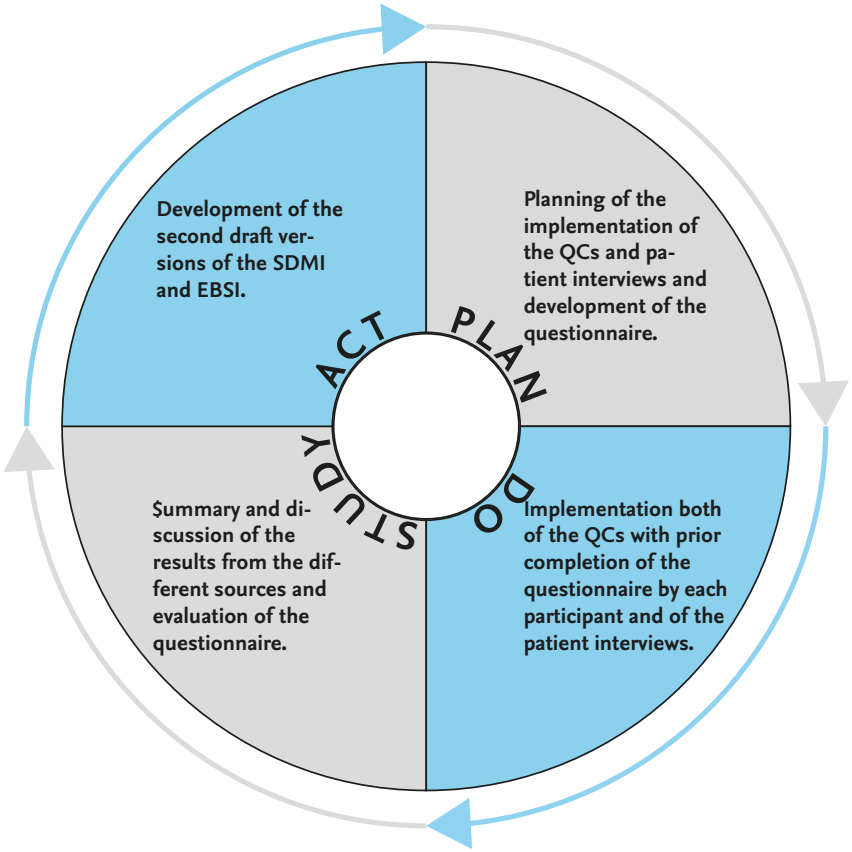
Systematic reviews and randomised controlled trials on different treatment options for lower UTI (antibiotics vs. non-steroidal-anti-inflammatory drugs (NSAID)/natural course) helped us to develop documents for EBSI and SDMI. We compared treatment effectiveness and complication rate in different studies and calculated the mean values of the average remission of symptoms with or without antibiotics [38-42]. We gathered additional information regarding aetiology, clinical and red flags to complete the EBSI.

We chose the layout Bakhit et al. (2018) had used, including all subitems and graphics. DH designed the SDMI using Adobe InDesign and Adobe Illustrator [16].

PDSA CYCLE II

Between January and March 2021, three QCs tested and improved the documents. DH and AR participated in three PCP QC sessions where they presented the EBSI tools for CME/CPD and SDMI. Three QCs located in Bern, Wil and Winterthur provided us with qualitative data for improving the tools for EBSI and SDMI. We anticipated that the participants would provide valuable information for making the tools more suitable for regular use (see Figure 2).

Figure 2: PDSA Cycle II



Based on the literature search and to collect quantitative data, TS and DH developed a questionnaire for PCPs to measure existing knowledge and attitudes towards prescription of antibiotics in the three types of infection. Using Likert Scales, they analysed a case study for each of the three types of infection to find out how PCPs would most likely handle a particular situation (supplementary file 1). They sent the questionnaire to all participating physicians to complete and return prior to each QC. This allowed TS and DH to evaluate the results and present them in the form of bar charts to the participating PCPs at the beginning of the QC sessions. We wanted to have data on the possible overestimation of both the extent of antibiotic treatment effects, and complication rates among untreated patients. The document we used to evaluate the questionnaire can be found in supplementary file 2.

First, we introduced the background and the aim and objectives of the project. We started by presenting the baseline results of the questionnaires, focusing on overestimation of the extent of treatment effects and complication rates among untreated patients. Then, we presented the key facts

for each condition in the EBSI and discussed different treatment options with the participants. During the sessions, we asked the PCPs whether the EBSI provided enough information to help them in making decisions between antibiotic or symptomatic treatment or whether they needed more information. This was because we wanted to learn what knowledge PCPs need to be able to introduce and implement SDM when prescribing antibiotics in their daily practice. During the second half, we focused on the SDMI by gathering feedback as to whether the tool could help in the process of SDM during consultations.

On January 14th 2021, ten PCPs participated in a 1½ hour QC session Winterthur. On February 18th 2021, 15 PCP members of a QC in Bern met online for one hour. On February 24th 2021, 12 PCP members of a QC in Wil met to discuss the first draft of EBSI and SDMI.

During the QC sessions, we asked the PCPs to invite patients for 20-30 minute telephone interviews so we could record their views after a consultation where the PCP had used the SDMI. BM developed and used an interview guide (supplementary information 3) and conducted six patient interviews between December 2020 and March 2021. The characteristics of the interviewees are summarized in supplementary information 4. Before the interview, each patient received written information and a consent sheet which we sent to BM who then contacted the patients. The focus of these interviews was to capture the patients' experiences regarding the SDMI. The interviews were digitally recorded and subsequently transcribed and anonymised. The transcripts were then analysed for content using MAXQDA software, which helped with coding the texts, summarising individual statements, and documenting the results.

To gather further input on the first draft of the documents, we invited two infectiologists and all the members of the Swiss paediatric association by e-mail.

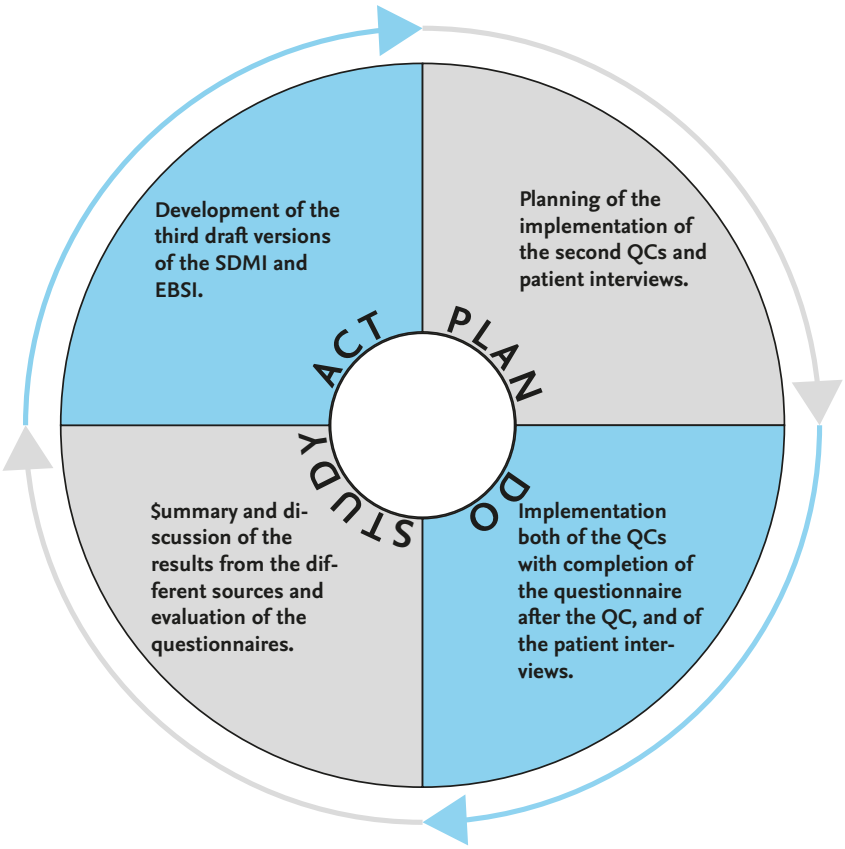
On March 1st 2021, the research team met to summarise, analyse and discuss the feedback collected from the three QC sessions, the patient interviews, and from e-mails from experts. Based on these data, we improved the EBSI and SDMI and adapted the documents according to the needs of the PCPs

and comments from the experts. The updated version of the SDMI and the EBSI was the starting point for the next PDSA cycle.

PDSA CYCLE III

We prepared for and conducted the third PDSA cycle between April and June 2021. DH and AR presented the improved version of documents during QC sessions in the same three groups as during PDSA II (see Figure 3).

Figure 3: PDSA Cycle III



We started the session by presenting the key facts on AOM, TP and UTI using the EBSI. The PCPs studied the documents a second time and discussed whether and how this kind of knowledge is important in the context of a consultation. Then we focused on the implementation of the SDMI in everyday practice using the case examples in the questionnaire and checked the practicability of the documents. During the process, we collected qualitative data to further improve the EBSI and SDMI. At least 3/4 of the group members had participated in first QC sessions, which is good for the

continuity of the group and its work. Either at the end or after the session, participants filled in the questionnaire, once more allowing us to compare differences in answers before and after the two sessions.

On April 21st 2021, 12 PCPs participated in a 1½ hour QC session in Wil, 10 of whom had participated the previous time. On May 6th 2021, 14 PCPs in Winterthur met for a similar QC session, 9 of whom had participated the previous time. On May 10th 2021, 12 PCPs from Bern met online using Microsoft Teams. Continuity was high here as well, with 11 out of 12 of those who had participated previously.

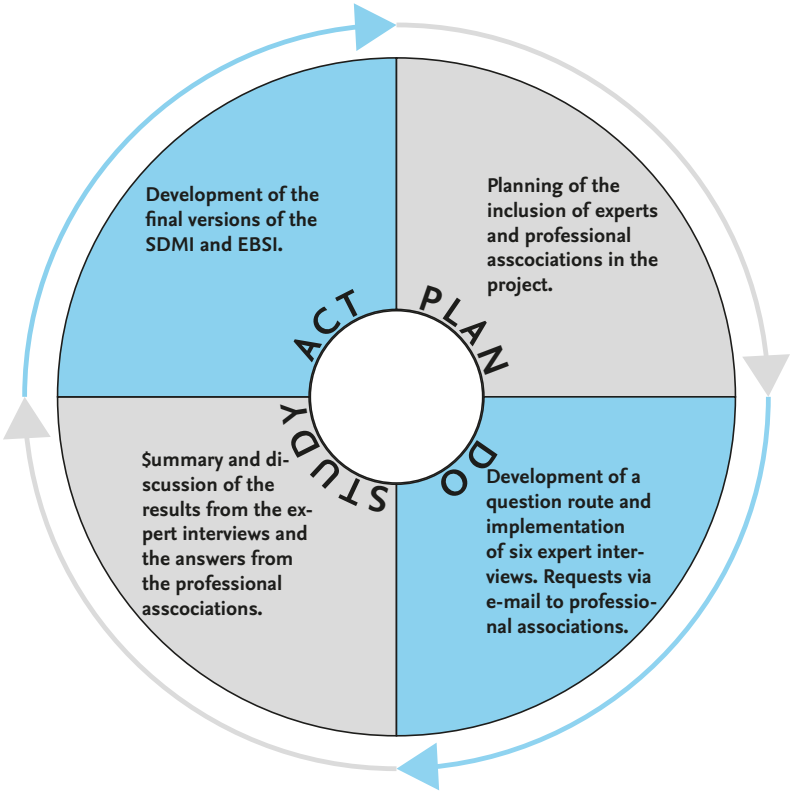
Concerning future patient interviews, we adjusted the interview guide to focus the questions more on the consultation process, as we wanted to learn more about how patients experienced the SDM process than how they experienced the SDMI (supplementary file 5). We wanted to learn how patients felt when they were involved in the process of SDM, how their PCPs used the SDMI and how they thought the SDMI, or the underlying process, needed improvement. We asked the PCPs to recruit patients for telephone interviews after a consultation where the SDMI was used. We conducted five patient interviews between May and September 2021. Before the interview, each patient received written information and a consent sheet that was sent to BM who then contacted the interviewees. The interviews were digitally recorded and subsequently transcribed. The transcripts were anonymised and then analysed for content using the MAXQDA software, to help code the texts, summarise individual statements and document the results. The characteristics of the interviewees are summarized in supplementary information 6.

On August 5th 2021, the research team met to summarise, analyse and discuss the feedback collected from the three QC sessions and the patient interviews. Based on these data, we again improved the EBSI and SDMI and adapted the documents according to the needs of the PCPs and to patient comments. The updated version of the EBSI and the SDMI was the starting point for the next PDSA cycle.

PDSA CYCLE IV

We planned and conducted the fourth PDSA cycle between June and November 2021. The purpose was to confirm that our documents were in line with recent evidence and fit for everyday practice. During the team meeting on August 5th 2021, we compiled a list of experts and professional associations we wanted to contact. A broad spectrum of experts in different fields would help cover the field of antibiotic prescriptions and SDM. Therefore, we contacted infectiologists, paediatricians, internists, their professional associations, experts in SDM and patient safety representatives (see Figure 4).

Figure 4: PDSA Cycle IV



After contacting them by e-mail, the recipients had the choice of either signing up for an online interview or answering by e-mail (supplementary file 7). We developed an interview guide that included questions about the content and layout of both the EBSI, and the SDMI, and whether the documents were in line with current evidence (supplementary file 8). We then focused on the topic of SDM in consultations involving AOM, TP or UTI. We wanted experts to express their views on the

practicability of SDM in these situations and whether they thought the SDMI could be helpful. We planned to conduct the interviews using Zoom meetings that provided a live broadcast of a video session as an accessible video stream. This technique allowed us to interview colleagues in the comfort of their own space providing synchronous visual interaction between the participant and interviewers [43].

The professional association for General Internal Medicine and the professional association for Paediatrics answered by e-mail. Six out of the twelve experts we contacted consented to an online interview (supplementary file 9). Each participant received information and a consent sheet prior to the Zoom meeting. DH and TS conducted the interviews after a briefing by BM, an expert in interviewing techniques. At the beginning of the meeting, DH and TS made sure that participants had understood the purpose and the content of the interviews. Characteristics of the interviewees, date, time, and length of sessions are shown in supplementary file 9.

DH and TS transcribed the recorded interviews, anonymised and analysed the transcripts for content using the MAXQDA software. They used the method of content analysis, where they first categorised the text using major and minor categories. The questionnaire provided the major categories. The minor categories emerged based on the transcript of the first two interviews. After DH and TS had coded the two interviews, BM reviewed and revised the coding. Based on this, DH and TS created the final coding guide with both the major and minor categories, including their definition. BM reviewed the coding guide once more and fine-tuned the minor categories. DH and TS coded the remaining four interviews based on this coding guide. They analysed and made summaries of the individual statements using MAXQDA and Excel.

On Oct 13th 2021, the research team met online to review the suggestions for modifications to the tools. We could then use the feedback from the experts to finalise the EBSI and SDMI.

RESULTS

PDSA I

Based on the literature review, we developed the first versions of the EBSI and SDMI (supplementary file 10) and we augmented existing key information in the guidelines on treatment effects using high grade evidence such as systematic reviews and randomised controlled trials.

DH and TS prepared and continually improved the EBSI based on our internal discussions. They paid special attention to the prevalence and incidence of AOM, TP and UTI, and the complication rates in different treatment groups, when patients received antibiotics instead of symptomatic treatment. The EBSI document consists of two pages: the first provides information about epidemiology, clinical course, possible diagnostic measures, differential diagnoses and red flags; the second provides comparisons of different treatment options concerning symptom duration and possible complications for each treatment option.

For AOM, we added information to the EBSI for patient age (6 months-15 years) and adjusted treatment effectiveness or the complication rate where the numbers regarding the advantages and disadvantages of antibiotics were investigated in a Cochrane review [44]. We then added the red flags and a paragraph about how AOM is managed in adults, based on information from www.guidelines.ch.[44-60]

In the SDMI for TP, we cross-checked the numbers in various studies and adjusted them according to Spinks et al. (2013) [61]. We modified the use of streptococcal antigen testing from two to three points (McIsaac Score) according to the health care context in Switzerland (www.guidelines.ch).[61-85]

For UTI, we included effects of antibiotic and symptomatic treatment in the EBSI and the SDMI, according to different studies [38-42]. We gathered additional information regarding aetiology, clinical course and red flags and completed the EBSI.[38-42, 86-99]

For the SDMIs for AOM, TP and UTI, we created two pages containing visual aids and text as in Bakhit's et. al PDA [16]. The first page had a visual aid combined with text and the second just textual information. We translated the resulting documents into German.

PDSA II

QUALITATIVE DATA

QC Winterthur (QC1)

10 PCPs participated in the QC. They showed great interest in the EBSI and wanted to learn more about the clinical course and effects of treatment options in AOM, TP and UTI. They were satisfied with content of the two pages and had no additional input. Discussion of the EBSI revealed that PCPs in Winterthur prescribed antibiotics for the three diagnoses mainly to avoid complications or to shorten symptom duration.

QC Participants in Winterthur suggested several ways of improving the SDMI. They felt that, with two pages, the SDMI had too much text and was too complicated for the use in consultations. They suggested cutting the text to a minimum but keeping the graphics as visual aids to emphasise differences in symptom duration over different time periods, for instance over three or five days, and in complication rates between treatment options with and without antibiotics. In addition, they suggested removing the entire second page containing specific patient information. They argued that it would be better to design an additional brochure which patients could take home. Some of the participating PCPs thought it would be helpful to have evidence-based information such as choice of antibiotics on the SDMI. For the complete set of data gathered during the QC process see supplementary file 11.

QC Bern (QC1)

15 PCPs participated in the QC. With the EBSI for TP, participating PCPs suggested that the likelihood ratio and pre-test probability should be better explained. Additionally, streptococcal resistance in Switzerland should be reported. They discussed the advantages and disadvantages of the

Centor-Score (a set of criteria which may be used to identify the likelihood of a bacterial infection) compared to the McIsaac-Score. A major concern was the distinction between the TP caused by Epstein Barr virus (EBV) and streptococci. PCPs wanted to have more information about the incidence, diagnostic measure and clinical course of EBV infections.

Another issue concerned diagnostic measures when patients made appointments because of a possible UTI, as some of the PCPs asked for a blood sample for c-reactive protein, or urine dipstick tests without first taking the medical history. A urine dipstick test is a test using a special strip of paper that is dipped into a sample of urine. The result is available almost immediately and can help diagnose UTI. The PCPs discussed the pros and cons for this procedure and decided that it was better to have sufficient anamnestic information before taking any samples at all, as in some cases diagnostic measures confuse more than they help.

In general, participating PCPs voted for less text in the SDMI. They suggested that we enlarge the graphics showing the advantages and disadvantages of antibiotics. Additionally, we should make the graphs more eye-catching and indicate the time periods in which symptoms usually subside with the different treatment options. They also suggested that we present and explain terms like ‘likelihood ratio’ or ‘pre-test probability’ more clearly. For the complete set of data gathered during the QC process see supplementary file 12.

QC Wil (QC1)

12 PCPs attended the QC. With the EBSI for TP, participating PCPs discussed whether the decision tree should start with the question as to whether antibiotics should even be considered an option for the patient. Most of the PCPs thought that it would be valuable to make a clinical assessment before dealing with that decision. As in Bern, PCPs in Wil needed more information about the incidence, clinical course and diagnostic measures of EBV infections. For UTI, they suggested that the EBSI should focus more on the red flags and describe the picture of severe illness better. In addition, they did not want to have the urine dipstick test in the decision tree, as it does not help in the diagnosis of UTI if you have a typical medical history. They asked whether there was any evidence for herbal

products in the treatment of UTI and whether antibiotic therapy is still in line with current evidence. Finally, they would have liked to see some information on prophylaxis of recurrent UTIs.

With the SDMI, PCPs suggested that we link the visual aids to the text in a better way and that we should check that the numbers in the graphics correspond with the text. Finally, they proposed that we include possible side effects due to non-steroidal-anti-inflammatory drugs (NSAID) in the SDMI for UTI. For the complete set of data gathered during the QC process see supplementary file 13.

Patient Feedback

BM interviewed 6 patients and summarised the data and their analysis in supplementary file 4. Interview data showed that patients want to talk to their PCP about the different treatment options. Some of the interviewees expressed a desire to have all appropriate treatment options presented to them. Patient data did not give any recommendations on how to improve the SDMI.

Expert Feedback

Based on the e-mail feedback from two infectiologists, we could not improve the documents. They focused on details like grammar or punctuation instead of on the design or the content of the EBSI or the SDMI. Representatives of the paediatric association suggested that we extend the follow-up time for children with AOM from two to three days as this seems to be implemented in everyday practice.

Summary of data

During the research team meeting, we discussed and evaluated the inputs gathered during QCs, the patient interviews and e-mail exchanges with the experts. Based on the input, we improved the EBSI and SDMI substantially. However, we decided not to consider creating patient information leaflets for the three infections because this was not focus of our project and because there is already a number of such leaflets available.

With the design of the EBSI, we introduced a standardized structure for AOM, TP and UTI. We kept the texts short and simple using bullet points instead of paragraphs. For the treatment of the different

infections, we followed the example of www.guidelines.ch. and added possible side effects and their rates for the different treatment options. In addition, we adapted the documents for each infection.

With the EBSI for TP, we adapted the decision tree and recommended streptococcal antigen testing only when the diagnosis is uncertain at the same time as antibiotic treatment comes into consideration. To complete information regarding EBV infections, we added a paragraph on incidence, diagnostic options and clinical course. We preferred the McIsaac-Score to the Centor Score because it has been validated for children <15 years. In a table, we showed that the McIsaac score differs from the Centor Score only by the additional age criterion. We described the terms ‘likelihood ratio’ and ‘pre-test probability’ in plain text. As streptococcal resistance is generally very low in Switzerland and hardly differs from area to area, we chose not to mention this in the EBSI.

With the EBSI for UTI, we added the side effects caused by NSAID. As UTI is described by a combination of well-defined symptoms and specifically excludes signs of severe illness such as fever or back pain, we decided to keep to the list of red flags without further explanation. We did not find any valid evidence (randomised controlled trials or systematic reviews) for the effect of herbal drugs in UTI so we could not give any advice for any specific phytotherapeutic agent. As the information is about simple UTI, we did not want to complicate the information with advice on recurrent UTI and its prevention.

We adjusted the layout of the SDMI, shortened the text and made it more concise. We tested various ways of presenting the results of treatment options in charts and chose to show how many people in 100 felt reduced symptoms after a certain number of days or suffered side effects. We enlarged the graphs so they could be readily used during consultations and replaced words like ‘cured’ with ‘symptom-free’ and ‘people’ with ‘individuals’, with the exception of children in the AOM SDMI.

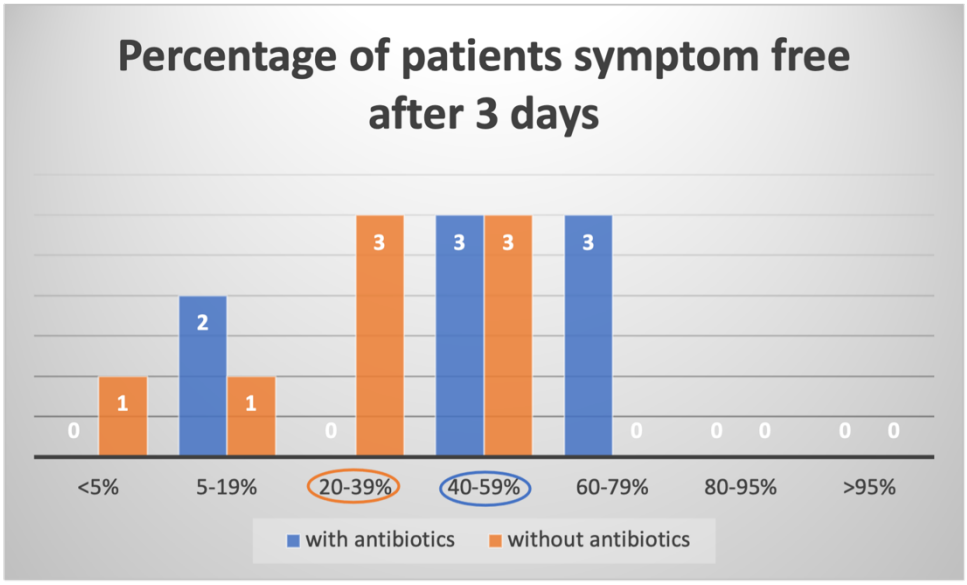
QUESTIONNAIRE

The purpose of the questionnaire is to stimulate QC participants to reflect on and improve their standard practice. During its development, we adjusted the options to answer the questions concerning treatment effects and increased the number of answer options concerning recovery and complication rate, according to the literature. Reflecting on the results of the questionnaire engaged participants in lively discussions and proved to be a good start for QC sessions. Therefore, DH developed a sheet in Excel for facilitators to make it effortless to analyse QC participants' answers (see supplementary file 2).

The changes in the questionnaire made that the participants in Wil had more options to answer specific questions. They appeared to approve of the questionnaire sheet, and the differing answer options did not seem to affect the results. To show and present the results, we merged the slightly differing questions into the same categories. Not all participating PCPs filled in the questionnaire and PCPs who completed the questionnaire sometimes did not answer all the questions. In general, all PCPs tended to overestimate the effect of antibiotics and overestimated complication rates among untreated patients. Supplementary file 14 gives an overview of the results. To illustrate specific questions, we present the results for particular questions and show them in figures.

One question concerned the percentage of patients with TP whose symptoms disappear within a three-day period with or without antibiotics. 3 out of 8 PCPs correctly estimated the percentage (20-39%) of untreated patients who became symptom-free. 3 out of 8 PCPs also estimated the percentage correctly (40-59%) for patients treated with antibiotics who became symptom-free. 3 out of 8 PCPs overestimated the effect of antibiotics. 2 out 8 PCPs underestimated the time to symptom relief both with and without antibiotics (Figure 5).

Figure 5: Symptom regress in patients with TP (QC Bern)



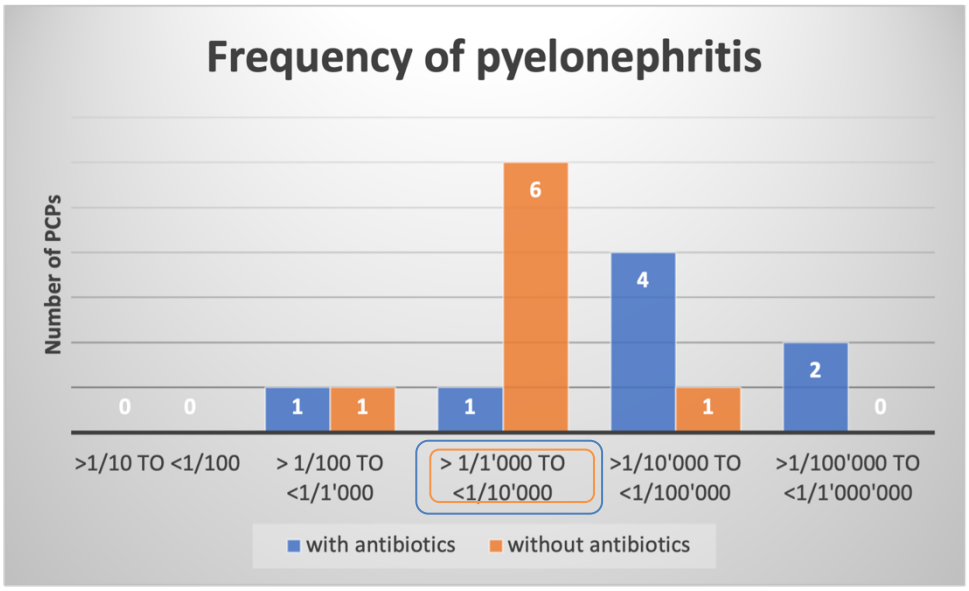
Legend

X-axis represents the numbers of PCPs choosing a particular answer.

Y-axis shows different answer options: blue being clinical change with antibiotics; orange being clinical change without antibiotics; the circled answer indicates the correct choice based on the literature search.

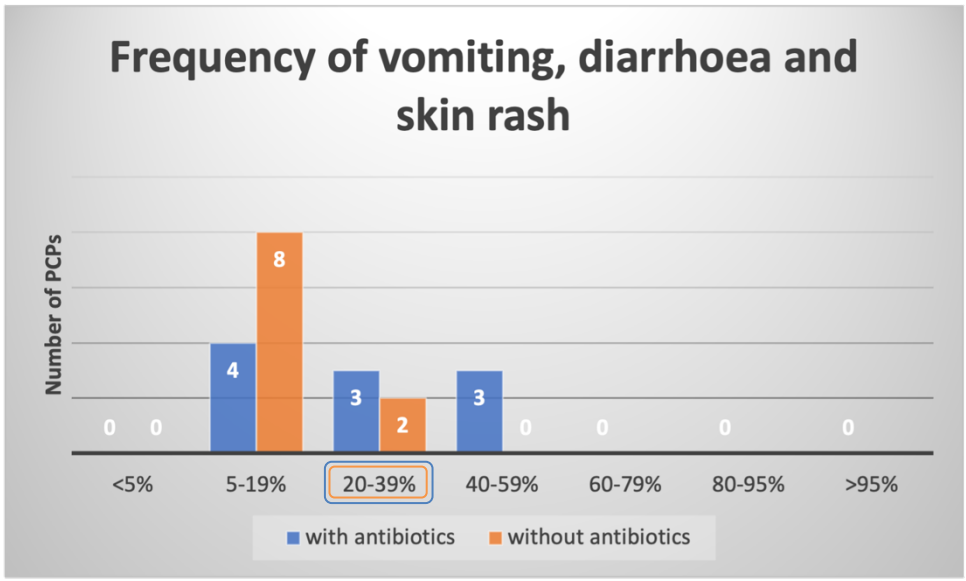
The next example concerns how PCPs estimate the risk for pyelonephritis in patients with UTI, with and without antibiotic treatment. 6 out of 8 PCPs correctly estimated the rate of pyelonephritis (>1/1,000 to <1/10,000) for patients with treatment, but 6 out of 8 PCPs underestimated this rate and thus overestimated the effect of antibiotics. 1 in 8 PCPs overestimated the rate of pyelonephritis, both with and without antibiotics (Figure 6).

Figure 6: Frequency of pyelonephritis in patients with UTI (QC Winterthur)



10 PCPs in Wil answered the question about frequency of listed concomitant symptoms (symptoms due to the treatment in addition to those due to the infection) in patients with AOM treated with and without antibiotics. 2 out of 10 PCPs correctly estimated the frequency of concomitant symptoms in untreated patients and 3 out of 10 correctly estimated their frequency in patients receiving antibiotics. 4 out of 10 PCPs underestimated and 3 out of 10 PCPs overestimated the frequency of concomitant symptoms in treated patients (Figure 7).

Figure 7: Frequency of side effects of antibiotics in patients with AOM (QC Wil)



PDSA III

QUALITATIVE DATA

QC Wil (QC2)

12 PCPs attended the QC this time. They felt that the EBSI was now complete and the new layout of the SDMI satisfactory. During role plays, participating PCPs experienced the difficulties of the SDM process. They realised that training in communication skills is key when implementing the SDMI. Success in communication and exchange of knowledge was dependent on the relationship between the PCP and the patient. In some cases, in the role play, the PCP was unable to convey the message to the patient and in others the PCP was unable to involve the patient in the decision-making process.

The PCP could convey evidence-based knowledge about the current infection and involve the patient in discussion to learn about their preferences when they worked in the adult-to-adult mode, according to Berne's transactional analysis theory. The tendency to slip into adult-child mode occurred all too frequently and hindered appropriate knowledge exchange between the role-players involved [100]. PCPs felt that the SDMI supported the SDM process when patients were either considering antibiotics or when they felt ambivalent. The role plays also illustrated how important it is to understand the clinical situation. SDMI for simple UTI does not work in the case of recurrent UTIs, and SDMI for TP does not work for coughs or similar symptoms of upper respiratory infections. In the case of UTI, SDMI seemed most suitable for women with a symptom duration of 2-5 days. For the complete set of data gathered during the QC process see supplementary file 15.

QC Winterthur (QC2)

12 PCPs participated in the QC. They confirmed that the SDMIs were clear and the EBSI complete. They considered the EBSIs to be good summaries of current knowledge but that they would appreciate a shorter version if possible. PCPs felt that they could use the SDMIs in their consultations. As with the PCPs in Wil, they thought it is important to involve patients in the decision-making process. They confirmed that communication skills are key when PCPs address their patients' ideas, concerns and

expectations at the same time as informing them about the benefits and harms of different treatment options. For the complete set of data gathered during the QC process see supplementary file 16.

QC Bern (QC2)

14 PCPs participated in the QC. They were pleased with the EBSI and most of the participants agreed that the SDMI was clear and helpful, although some thought it was too complicated for daily use. They argued that the different time periods were confusing for patients and suggested showing one period of time only, for instance after 7 days. In addition, they wanted to have the documents up and ready for use on the desk. They believed that PCPs would not use them if they first had to look for them. They agreed that presentation of side effects was clear and distinct.

PCPs discussed the implementation of SDMI in everyday practice, based on the UTI discussion example in the questionnaire. Some PCPs insisted on performing urine dipstick tests and blood samples even though these tests may not be helpful in treatment decisions for UTI. Lab analyses served as arguments for or against antibiotic treatment but were not in line with the evidence as illustrated in the EBSI. Nevertheless, all agreed on the necessity of involving the patients in the decision-making process using the SDMI by granting patients more autonomy. For the complete set of data gathered during the QC process see supplementary file 17. As to the input from PCPs, no new topic came up and we felt we had reached data saturation.

Patient feedback

BM interviewed 5 patients and summarised the data and their analysis in supplementary file 6. All of the patients appreciated the process of SDM and liked being actively involved in the consultation. At least 3 out 5 patients thought the SDMI was helpful. Two patients would have welcomed a patient information sheet as additional information to take home. They emphasised that the ‘individuals’ charts on the SDMI were convincing and helped them understand and reflect on their personal preferences. In general, responses to the SDMI were very positive and interviewees expressed a desire to participate in other clinical decisions with the help of SDMI. Based on this feedback, we did not adjust the SDMI any further.

Summary of data

The research team summarised, analysed and evaluated the data sets. Our changes to the documents had pleased the participants and few suggestions were left to put into practice: the EBSI should be as short as possible, but leaving the content unchanged and the SDMI should only be one page with as little text as possible.

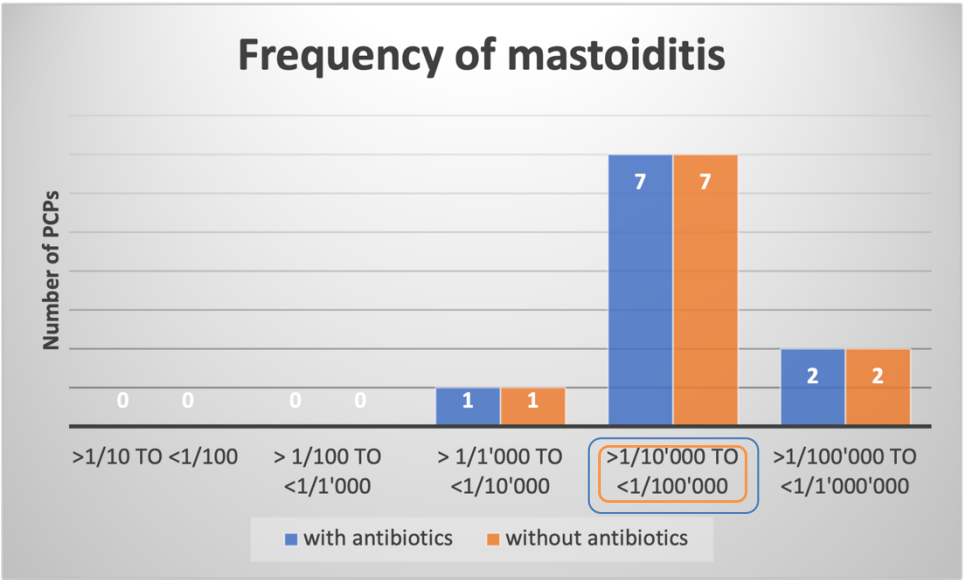
With the SDMI, we confined ourselves to two periods of time in each of the conditions to help patients understand the course of the symptoms and we cut the text to a minimum. To please the busy PCPs, we put the algorithmic decision trees on the back side of the SDMI, which they greatly appreciated. We stopped examining the data when additional analysis no longer provided new information and we had reached data saturation.

QUESTIONNAIRE

All of the PCPs filled in the same questionnaire after the QC sessions. Analysis of the results showed that their estimates of the benefits and harms of antibiotic prescription became more accurate, and their views on complication rates more realistic. Some PCPs chose not to answer all questions. Supplementary file 18 gives an overview of the results. To illustrate specific questions, we present the results for particular questions and show them in figures.

10 PCPs in Wil answered the question concerning the complication rate of mastoiditis in patients with AOM, with and without antibiotic treatment. 7 out of 10 PCPs correctly estimated the complication rate in patients without antibiotics (>1/10’000 to <1/100’000) and 7 out of 10 with antibiotic treatment. 2 out of 10 PCPs underestimated the the complication rate in patients with AOM, both with and without antibiotics. 1 out of 10 PCPs overestimated the frequency of mastoiditis, both with and without antibiotics (Figure 8).

Figure 8: Frequency of mastoiditis in patients with AOM (QC Wil)

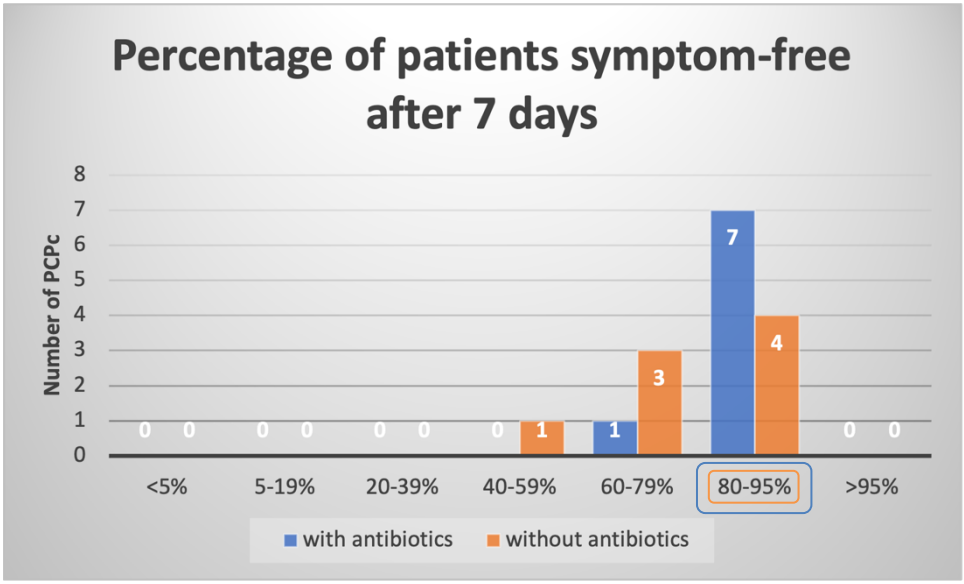


Legend

The figures represent the course of the infection with antibiotics in blue and the course without antibiotics in orange. X-axis represents the numbers of PCPs choosing a particular answer. The numbers in the columns indicate how many PCPs chose the corresponding answer. The Y-axis shows the various possible response options that were available. The answer circled in blue indicates the most likely course with antibiotics based on the literature research, and the answer circled in orange indicates the most likely course without antibiotics based on the literature research.

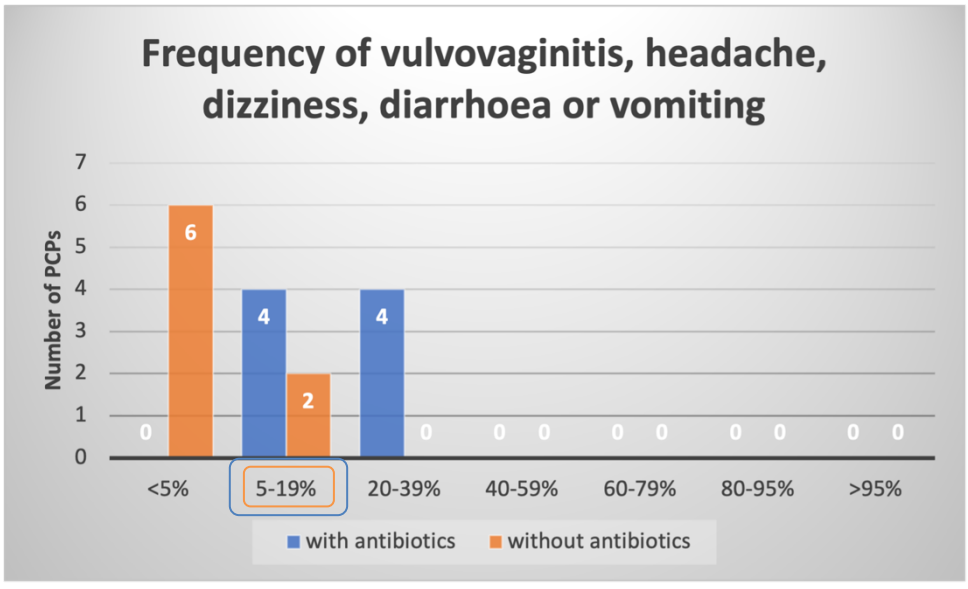
8 PCPs in Wil answered the question on the percentage of patients with TP whose symptoms disappear after seven days either with or without antibiotics. 4 out of 8 PCPs correctly estimated the percentage of patients (80-95%) who became symptom-free without antibiotics and 7 out of 8 correctly estimated the percentage of patients (80-95%) who became symptom-free with antibiotics. 4 out of 8 PCPs underestimated the self-healing tendency without antibiotics (Figure 9).

Figure 9: Symptom regress in patients with sore throat (QC Winterthur)



8 PCPs in Bern answered the question on the frequency of vulvovaginitis, headache, dizziness, diarrhoea or vomiting in patients with UTI as a consequence of antibiotic treatment. 2 out of 8 PCPs correctly estimated the frequency of these symptoms in untreated women. 4 out of 8 PCPs correctly estimated the frequency of side effect with antibiotics. 6 out of 8 PCPs underestimated the presence of the listed symptoms even without antibiotics. 4 out of 8 PCPs overestimated the side effects of antibiotics (Figure 10).

Figure 10: Frequency of concomitant symptoms in patients with UTI (QC Bern)

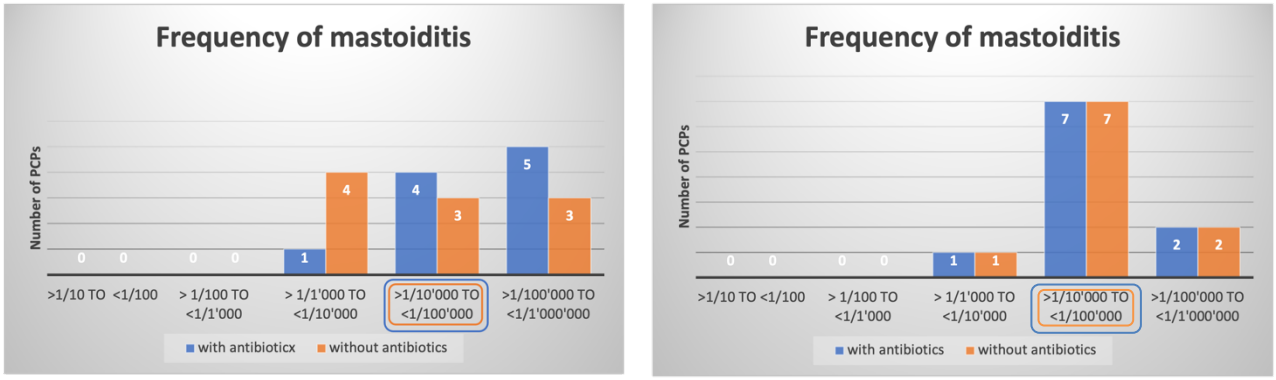


We then compared the questionnaire answers the PCPs had filled in from the first and the second sessions. Unfortunately, participants of the QC in Bern did not accurately flag whether they had filled them in after the first session, the second session or both sessions, so we took the results as if they all had filled in the questionnaire twice.

Data show a tendency of increased knowledge about epidemiology, clinical course, diagnostic measures, and treatment of the three infection types. Concern about complications in untreated patients seemed to decrease. To aid comprehension, we presented examples of change in the PCP responses concerning symptom regression, complication rates and side effects of antibiotic treatment.

We compared how PCPs estimated the frequency of mastoiditis in patients with AOM treated with and without antibiotics both before and after the two QCs. Generally, the PCPs estimated the frequency of mastoiditis more accurately after two QCs (Figure 11).

Figure 11: before and after two QCs: PCPs estimating the frequency of mastoiditis in patients with AOM (QC Wil)



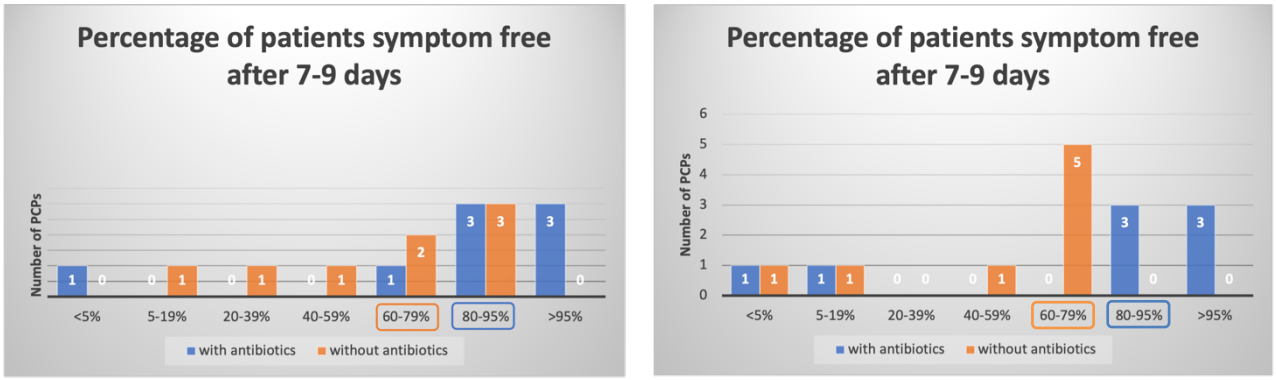
Legend

On the left, answers 10 PCPs gave before the first QC. On the right, answers 10 PCPs gave after two QCs. The answer circled in blue indicates the most likely course with antibiotics based on the literature research, and the answer circled in orange indicates the most likely course without antibiotics based on the literature research.

8 PCPs in Bern answered the question about the percentage of patients with UTI who are symptom-free after 7 to 9 days with or without taking antibiotics. The PCPs generally estimated the percentage

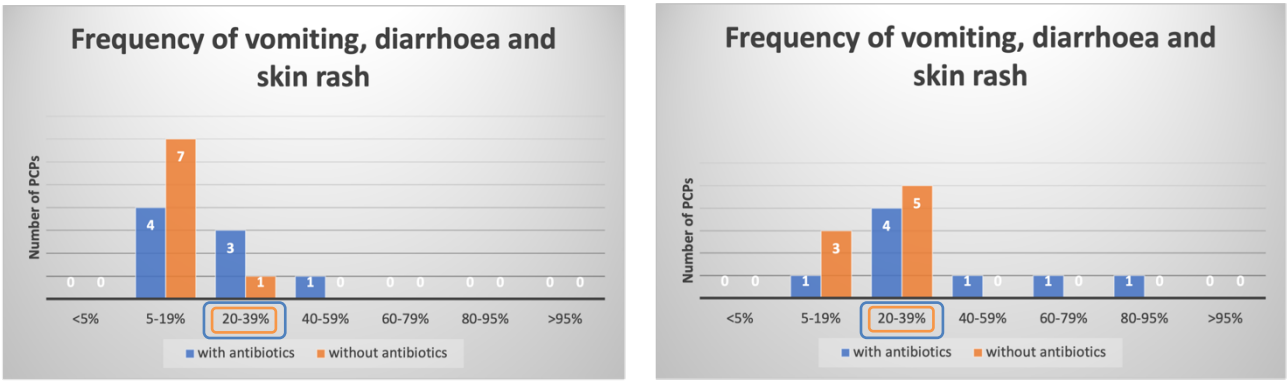
of patients who became symptom-free without antibiotics more accurately. The estimates of patients treated with antibiotics remained about the same (Figure 12).

Figure 12: before and after two QCs: PCPs estimating the percentage of symptom-free patients 7-9 days following a UTI (QC Bern)



8 PCPs in Winterthur answered the question concerning the frequency of vomiting, diarrhoea, and skin rash in patients with UTI treated with and without antibiotics. Generally, the PCPs estimated the frequency of concomitant symptoms in patients with and without antibiotics more accurately after the second QC. The awareness of antibiotics asscociated concomitant symptoms improved (Figure 13).

Figure 13: before and after two QCs: PCPs estimating the frequency of vomiting, diarrhoea, and skin rash in patients with AOM (QC Winterthur)



PDSA IV

EXPERT FEEDBACK

DH and TS interviewed 5 experts and summarised the data and their analysis in the supplementary file 19. According to interview data, the experts experienced the layout of the EBSI as confusing. They pointed out that the content had to be arranged in a different way and they suggested working with boxes and colours [101], and to highlight the most important aspects [102].

They were impressed by the content and confirmed that it was up to date. There were a couple of subtle differences that do not affect diagnostic procedures and treatment pathways and we accounted for these in the supplementary file 19. The experts agreed that the documents contain all the information a PCP needs for treatment decisions concerning AOM, TP or UTI [103]. Each of the interviewees had specific thoughts on small details in the text. However, the opinions did not concur across the group and, therefore, we were not able to formulate any changes we could implement in the documents.

Based on this feedback, we created a new layout for the EBSI using boxes and colours to standardise the documents. We signposted epidemiological facts, the clinical course, red flags, diagnostic procedures and therapeutic options in the same way in all documents so that PCPs can navigate quickly to the answers to their questions. We included specific points made by the experts in the EBSI. With the EBSI on AOM, we made explicit reference to the fact that the recommendations apply to children of 6 months and older [104] and that unilateral hearing loss requires antibiotic treatment to avoid unnecessary risks [105]. With the EBSI on TP, we added the information that EBV rapid tests do not affect treatment options [106] and flagged that if a patient cannot open their mouth (trismus), this may be a sign of the development of a peritonsillar abscess [107].

Where evidence was questioned, we consulted with the literature and www.guidelines.ch. We could corroborate the statements questioned from the EBSI sheets in the literature and decided not to

implement any more of the suggested changes. For the final versions of the EBSI see supplementary file 20.

Five experts and one representative of the patient safety foundation contributed data to improve the SDMI, meaning that we conducted six interviews about the layout and the content of the SDMI. Five people confirmed that the layout of the design makes it easy to follow and understand the clinical details of each infection. All interviewees agreed that the SDMIs support the process of SDM especially when PCPs first explain the content of the document to their patients, who then have a visual aid that helps them understand the course of the infection and the consequences of their treatment choices.

One interviewee mentioned that the graphics were not readily understandable and suggested the use of bar charts instead [108]. Two interviewees thought that the emphasis of the content was too much on being symptom-free after three days (TP) or 24 hours (AOM). They suggested removing the corresponding box and, instead, adding a box with information on the complication rates instead [109]. In addition, they proposed emphasising possible damage to the normal gut flora as an additional side effect of antibiotics [110]. As we believe that the purpose of the SDMI is to foster shared decision-making in a specific self-limiting infectious disease, we did not want to add generic and largely well-known reasons on each SDMI.

The representative of the patient safety foundation pointed out that the word ‘individuals’ was too abstract for patients and that alternatives such as ‘patients’, ‘women’ or ‘children’ should be considered [111]. Based on this feedback, we decided to use the word ‘woman’ for UTI as the term simple UTI concerns women, the word ‘children’ for AOM as most patients who present with this condition are children, and the word ‘the affected person’ for the SDMI for TP. In doing so, we were able to better define and label the target population. The interviewee suggested explaining what was meant by the expression ‘symptom-free’, which we then replaced with ‘pain free’ in AOM and TP but left it as it was in the SDMI for UTI as this clinical condition includes typical symptoms. She also suggested labelling what the red and green dots mean and adding a heading to indicate where the side

effects are mentioned. As a result, we coloured the words ‘pain free’ and ‘symptom-free’ in the same shade of green as the dots indicating patients without pain or without symptoms. Interviews showed that patients understand that red means suffering concomitant symptoms with or without antibiotics. Patients also understand that the difference in the number of red dots between the two columns indicates the rate of an antibiotic treatment. Finally we dated the current version and will indicate the source as soon as we know which website it will be published on [112]. For the complete set of data, see the supplementary file 19. Even though we had gathered data from only six experts, we felt that the sources no longer provided further information and we had reached data saturation. For the final versions of the SDMI see supplementary file 21.

FEEDBACK FROM PROFESSIONAL ASSOCIATIONS

The Professional Association for Paediatrics provided us with feedback on the documents. They acknowledged the changes and complimented the content and layout of the SDMI. One member thought that the content was too detailed without being able to indicate what we could omit. Finally, they recommended that we change the term ‘individuals’ to ‘children’ on the SDMI on AOM. We did not get any responses from the Swiss Association of General Internal Medicine possibly because infectiologists who are members of that association answered individually as experts in their field.

UNEXPECTED DEVELOPMENTS

SCRIPT FOR MEDICAL STUDENTS AT THE INSTITIUTE OF MEDICAL EDUCATION (Bern)

In the sixth year of medical studies in Bern, students take part in communication training and role play different scenarios. Among other skills and competencies, they practice shared decision-making with actors who take on the patient role. Until now, the scenarios used for these training sessions were rather complex, and students often got lost in the details of severe diseases and social hardships. The head of the communication training centre at the Institute of Medical Education (IML) at the University of Bern heard about our project and became interested in our way of letting patients

participate in consultations. We rewrote the script that students use as a teaching tool for communication training. We also got the opportunity to create and write a simpler scenario for the practical training sessions at the University where an actor-patient seeks help for her UTI symptoms. During several Zoom meetings, we developed the scenario for the students and the actor-patient based on the EBSI and the SDMI. Students will learn about SDM early in their careers and our documents will be part of their training sessions. We expect that this will promote critical thinking among students and hope that they will distribute the EBSIs and SDMIs among their colleagues. The scenario training will come into use in spring 2022.

TRAINING VIDEOS FOR MEDICAL STUDENTS AT THE UNIVERSITY OF BERN

The IML asked us to produce a video about a situation where SDM would come into use. The video should serve as an illustration for medical students to show them how the principles of SDM can be applied during consultations. We were able to contribute with our documents and developed a scenario where an actor-patient pretended to need help because of a TP. TS wrote the detailed text for the scenario and took part in the role as a PCP using the SDMI for TP during the consultation. The video will be used as an introduction to the communications course for medical students at the IML.

SMARTER MEDICINE / CHOOSING WISELY ONLINE COURSE

The Choosing Wisely movement in Switzerland is part of a global initiative aimed at improving conversations between patients and their PCPs. They can make better decisions when discussing the evidence with their patients, whilst taking into consideration what is important to them. Often, this will help to avoid unnecessary tests, treatments or procedures that are unlikely to be of benefit. Choosing Wisely publishes top five lists of unnecessary treatments for each medical discipline. One of these five issues in primary health care is the overuse of antibiotics in self-limiting infectious diseases such as common colds. Based on our EBSIs and SDMIs, PCPs at Medbase, a network providing primary health care across Switzerland, created an e-learning course for PCPs that serves as CME, providing credits. They also wrote a script for facilitators so they can use the documents for CME, professional

development, and quality improvement when they teach more about self-limiting infections and train SDM skills in their QCs.

DISCUSSION

SUMMARY

We developed appropriate evidence-based information for QC work and communication tools for PCPs to stimulate shared decision-making during consultations when choosing between antibiotic prescription and the wait and see approach in potentially self-limiting infectious diseases, namely TP, AOM and UTI. The tools should facilitate knowledge transfer between PCPs and their patients about the benefits and harms of antibiotics. During consultations, they should help the patients to talk about their preferences and values concerning the antibiotics or wait and see approach treatment options. During four PDSA cycles, we developed and confirmed three EBSIs and three associated SDMIs using literature-based versions as a starting point, followed by feedback from PCPs in QCs, experts, and patients who helped us to continuously improve the documents. We created a questionnaire to start the discussions in the various QCs to capture the knowledge PCPs have about the three infectious diseases and their attitude towards treatment options. Asking them to fill this in before the first and after the second QC session allowed us to gain insight in how their attitudes and treatment options changed over time. During role plays in QCs, PCPs showed difficulties implementing the SDM process. They had to become confident using the SDMI and they needed to practice communications skills in the safe environment of a QC to become familiar with the process of shared decision-making in daily practice.

COMPARISON TO EXISTING LITERATURE AND LEARNING POINTS

According to the literature, SDM may increase the ability of PCPs to understand their patients' preferences whilst lowering antibiotic prescription rates [14-16]. To involve patients in antibiotic prescription decisions, PCPs first need to gain knowledge about their true effectiveness [113]. Simple evidence-based summaries and prescription patterns discussed in QCs seem to improve PCP understanding of the true risks and benefits of antibiotic prescriptions and reduce the amount of prescribed medication and diagnostic testing [13, 25, 26, 114]. Changing longstanding habits is not

easy for PCPs and the sudden change from prescription of antibiotics to a wait and see approach may cause cognitive dissonance, a negative emotional state triggered by conflicting perceptions, that makes them reflect on their way of working. But PCPs can reflect on and alter their attitudes and behaviours without fear of risking their professional reputation in the safe atmosphere of a QC [115, 116]. If physicians feel convinced by the latest evidence, and if they are able to involve patients in a shared decision-making process, then antibiotic prescribing will decrease because informed patients become wary of over-prescribing of antibiotics [14-16, 36, 117].

In the QCs we attended, we saw that PCPs were able to increase their knowledge on the three infectious diseases. From individual examples of patient interviews, we saw that patients appreciate being involved in the decision-making process. When presented with the facts using the SDMI, they were more inclined to choose symptomatic treatment or the wait and see approach. According to the sparse data we gathered, we can confirm that an increase in PCP knowledge along with the appropriate use of the SDMI may reduce antibiotic prescriptions in the Swiss setting.

In contrast to other research projects on SDM and antibiotic prescribing, we chose to develop a tool that promotes communication between the physician and patient (SDMI). To distinguish clear advantages or disadvantages between a PDA and our SDMI, we would need to compare the two tools in a further study. Both PCPs and patients appreciated the SDMI we created, and they confirmed that these tools may be useful in everyday practice. As opposed to the PDA, the SDMI quickly shows information that is important to patients and PCPs for decision-making[35, 36]. It supports communication and facilitates individual approaches to addressing the ideas, concerns and expectations of the patients [36, 117, 118]. The effect of this tool may be due to several established behaviour change techniques: the rehearsal of behavioural practice by PCPs, the use of credible sources, information about health consequences and finally the support patients feel they get from their PCP in their choices [119]. However, SDMI are not self-explanatory and so PCPs have to familiarise themselves with their content and use during a consultation, as opposed to a PDA, which they can hand over to a patient for information without further explanation.

Our data from QC observations showed that some PCPs have difficulty understanding the principles of SDM and others implement it using poor communication techniques. Literature confirms that PCPs have to be confident about the content of the SDMIs and they have to practice the skills to use them appropriately in everyday practice [37, 120]. For instance, clinician communication ought to convince parents that antibiotics are only needed to treat more severe illnesses when they seek medical help for their children. In line with the literature, we experienced that interventions to reduce antibiotic expectations need to address the actual communication within the consultation, prescribing behaviour, and the beliefs of the patient [121]. In other words, PCPs have to practice transfer of knowledge using appropriate language and involve patients in the SDM process, taking into account their values and preferences [118]. SDM is not a single step to be added into a consultation, but a process that can be used to guide decisions about diagnostic and treatment choices throughout the consultation, provided that PCPs use appropriate communication techniques and patients are willing to do their part [122].

STRENGTHS AND LIMITATIONS

One limitation of this project is the limited sample size of patients and perhaps also of the experts, even though we felt that the experts did not add any further points and we had reached data saturation. Generally, and considering all facts, the data from experts, PCPs and patients that guided the development of the tools were in line with current literature. In order to validate our qualitative data from patients, a more extensive collection of data would be necessary. The data originating from the answers to the questionnaire show trends of knowledge improvement but do not lend themselves to statistical analysis.

To make the questionnaire fit the needs of PCPs, we altered some questions which may have affected the results we gathered from PCPs of the QC in Wil. This hinders a comparison between the QCs in Wil or Winterthur and the QC in Bern.

One strength of this project is that the tools are based on literature that include quantitative or qualitative data or theories. We created the tools based on these facts and theories and used a participatory approach that allowed PCPs in QCs, patients, experts and professional associations to

check and develop the emerging documents with their perspectives. QCs participants were able to learn from each other and practice communication skills concerning SDM, which was then the start of the dissemination of the tools.

DISSEMINATION

The participatory approach we adopted actively involved QC participants from different regions in Switzerland and national experts. The PCPs of these QCs already use these tools or know about them, and spread knowledge about the content and use of the EBSIs and SDMIs. Medbase, a nationwide physician network providing primary health care, was involved in the development of the tools with two QCs and will support their spread through their facilitators to implement them in their other QCs. Medbase also developed an online learning tool on antibiotic prescriptions in self-limiting infectious disease based on our findings. The Swiss Society of General Internal Medicine (SSGIM) approved this tool and now rewards participating PCPs with CME credits (educational activities which serve to maintain, develop, or increase knowledge, skills and professional performance).

The Institute of Medical Education at the University of Bern (IML) uses our findings and the tools as teaching material in their courses. We re-wrote the script that students use as a teaching tool for communication training and added the example of UTI as a scenario for an actor-patient and a student to train their communication skills. In addition, the IML asked us to produce a video as an illustration for medical students to show them how the principles of SDM can be applied during consultations in a scenario where an actor-patient role-played needing help for a TP.

To ensure that the documents are used in everyday practice, we must make them easily available. We plan to publish the results in an international journal, preferably BMI Open Quality, and in a Swiss journal that PCPs have access to, preferably Primary and Hospital Care.

Since the tools are suitable for QCs, we will make them available to the Swiss Forum for Quality Circles (SGAIM) and promote them among tutors and facilitators of QCs. The SGAIM organises basic

training courses and advanced training for facilitators, and the future script to be developed within Medbase may be approved and used by other QCs or QC networks.

In addition, we contacted representatives of the 'smarter medicine' movement as inappropriate antibiotic prescription is on their top five list for PCPs and paediatricians. Our goal is to make the tools available on their website. Finally, we would like to attach them to the www.guidelines.ch website as tools that reinforce appropriate antibiotic prescription. We have also established contact with the StAR-M Core-Team (Strategy on Antibiotic Resistance).

FURTHER RESEARCH

Patient data in relation to PDAs, or in this case the SDMI, and the SDM process are lacking for Swiss ambulatory care. A greater number of interviews and more in-depth interviewing techniques might be able to shed further light on aspects that are important to patients and on patient safety.

What we developed are tools that are based on a theory. The underlying theory is, that if PCPs involve patients in the decision-making process when prescribing antibiotics, they will come to understand patient expectations and preferences, and lower their prescription rates, because informed patients develop a critical attitude towards antibiotics. Even though there is literature supporting this theory (see earlier references), it should be tested within Swiss primary care using a mixed method approach. This approach may even be valid for other clinical situations, for instance prescription of sleeping pills for sleep disorders, proton pump inhibitors for heartburn or statins in primary cardiovascular prevention.

CONCLUSION

The aim of the research project was to promote shared decision-making for antibiotic treatment for three common self-limiting infections, AOM, TP and UTI. The underlying concept is, that if PCPs involve patients in the decision-making process when prescribing antibiotics, they will come to understand patient expectations and preferences whilst lowering their prescription rates, because informed patients develop a critical attitude towards antibiotics. Therefore, we developed appropriate evidence-based information for QC work and communication tools for PCPs to stimulate shared decision-making in consultations when choosing between antibiotic prescription or the wait-and-see approach. We used a participatory approach and involved 6 experts, 11 patients and 39 PCPs to develop and improve the tools in four PDSA cycles. To implement the tools in daily practice, data from QC sessions showed, in line with the literature, that PCPs need to be confident about the current evidence and they need to practice communication skills in the safe environment of a QC to become familiar with the process of shared-decision making.

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101. Cf. "Interview 2, 01.09.21", and "Interview 5, 02.09.21"

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103. Cf. "Interview 3, 01.09.21", "Interview 4, 23.09.21" and "Interview 5, 02.09.21"

104. Cf. "Interview 5, 02.09.21"

105. Cf. "Interview 2, 01.09.21"

106. Cf. "Interview 5, 02.09.2021"

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108. Cf. "Interview 3, 01.09.21"

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