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www.fevertravel.ch: An online study prototype to evaluate the safety and feasibility of computerized guidelines for fever in returning travellers and migrants

THESE

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par

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Résumé

Suite à la publication des recommandations de pratiques cliniques sur la prise en soins de patients fébriles au retour des tropiques, nous avons développé un site internet de consultation www.fevertravel.ch qui comprend un arbre décisionnel et des caractéristiques diagnostiques spécifiques fournissant une assistance diagnostique aux médecins de premier recours. Nous avons ensuite intégré une composante de recherche afin d'évaluer l'implémentation de ces recommandations de pratiques cliniques informatisées. De plus, le site est capable d'enregistrer : (1) le chemin parcouru par le médecin au travers de l'arbre décisionnel, (2) les tests diagnostics effectués, (3) les diagnostics initial et final ainsi que les devenirs des patients et (4) les raisons de non-adhérence lorsque les médecins divergent de l'attitude proposée.
Nous croyons que la technologie internet est un moyen puissant pour atteindre des médecins provenant de différents horizons dans leur propre environnement et qu'il pourrait se montrer être un outil de recherche efficace pour disséminer les recommandations de pratiques cliniques et évaluer leur justesse-adéquation.
Dans cet article, nous décrivons le design, le contenu, l'architecture et l'implémentation du système de ce prototype d'étude interactive qui vise à intégrer une recherche opérationnelle en médecine de premier recours.

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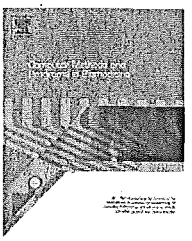

www.fevertravel.ch: An online study prototype to evaluate the safety and feasibility of computerized guidelines for fever in returning travellers and migrants

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ABSTRACT

Following the paper publication of practice guidelines for the management of febrile patients returning from the tropics, we constructed a consultation website www.fevertravel.ch that comprises a decision chart and specific diagnostic features providing medical diagnostic assistance to primary care physicians. We then integrated a research component to evaluate the implementation of these computerized guidelines. This study website has the same interface as the consultation website. In addition, one is able to record: (i) the pathway followed by the physician through the decision chart, (ii) the diagnostic tests performed, (iii) the initial and final diagnoses as well as outcome and (iv) reasons for non-adherence when the physician diverges from the proposed attitude. We believe that Internet technology is a powerful medium to reach physicians of different horizons in their own environment, and could prove to be an effective research tool to disseminate practice guidelines and evaluate their appropriateness.

Here we describe the design, content, architecture and system implementation of this interactive study prototype aimed at integrating operational research in primary care practice.

1. Introduction

Many studies have shown that guidelines are an ineffective way in changing physicians behaviour [1,2]. A growing number of medical literature present in the World Wide Web as a promising media for guidelines and diagnostic expert system implementation [3–8]. Guideline implementation strategies most likely to be effective are those that deliver patient-specific advice at the time and place of consultation [9].

Because of the interactive and spreading potential of computerized material, the World Wide Web (whether in the form of CD, institutional intranet pages or Internet websites) has also emerged as an efficient tool for the dissemination of guidelines into medical practice [5,6,10–14]. Online guidelines offer the potential for rapid up-dating [15], effective dissemination and free availability at the location and time of need. They also allow for the use of multimedia resources and hyperlinks [6,12].

Recently, some pioneers have begun to use the net for scientific research [14,16]. This choice was first driven by the difficulty to conduct new types of investigations using classical tools, especially those requiring interactivity or large

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sample size. The medical field explored the World Wide Web to conduct surveys, randomised controlled trial to test drug efficacy, and feasibility studies on the implementation of web-based practice guidelines [3,8,14,16–18]. None of these studies were fully computerized; the need for signed informed consent and consultation of paper medical records are examples of the practical barriers that are difficult to solve [3]. Investigators have concluded that Internet usage allows rapid recruitment, shortens study duration, and potentially reduces costs [3,8,14,16–19]. Moreover, it allows access to a large range of demographical and cultural variety of subjects, and reduces time constraints and organizational problems [3].

Following these promising experiences, both in guideline promotion and research conduct, we decided to use this technology to disseminate and evaluate our practice guidelines for the management of fever cases returning from the tropics among the target audience, namely primary care physicians. Our work is innovative in the field of travel medicine because, to our knowledge, there are no studies of diagnostic expert system for managing patients with fever following travel described in the literature up to now. We attempt to design a fully computer-based study system to evaluate the safety and usefulness of these practice guidelines.

2. Background

Nowadays, due to globalisation travelling to tropical country is becoming more common place, and returning with fever is a frequent feature [20,21]. The underlying disease can be rapidly fatal, if not diagnosed in time. Physicians from developed countries are thus confronted with imported diseases with which they feel ill at ease [22]. Little evidence-based information exists to guide clinicians on which specific diagnostic tests to propose in a particular situation [23], and when to consider presumptive treatment [24]. There is, thus, a considerable variation in the management of such cases [25].

For the above reasons, we developed formal practice guidelines for the evaluation of fever in travelers and migrants in order to support decision making and improve the knowledge of primary care physicians. This was achieved using an evidence-based approach completed by a process of gathering explicit international expert opinion [26]. The recommendations rely on key features of the patient's history, physical examination, and basic laboratory tests, which are relevant for the establishment of the diagnosis and/or the prescription of presumptive treatment.

Since paper guidelines published in specialized journals are not easily accessible, and therefore not useful for the target audience, we constructed a consultation website to make the recommendations available at the location and time of need (www.fevertravel.ch) [27]. Because of the low level of evidence available in the field of travel medicine, we added to this website research components aimed at evaluating the safety of the recommendations and feasibility of their implementation through the Internet. We hope that this research component will be a mean to extract evidence from the clinical practice.

3. Design considerations

The online study prototype was designed to consist of a fully computerized system, including the guidelines content, plus an easy procedure for data collection and management, which provides a rapid and efficient communication medium between participants and investigators whilst respecting good clinical practice. This fully computer-based research system is designed to help us evaluate physicians' adherence to the recommendations and investigate the reasons for non-adherence. This system tries to respect legal and ethical concerns to ensure the safety of the recommendations for the targeted patients. The ultimate goal of such a system is to try to improve the quality of the guidelines, in particular to tailor them for the specific needs and wishes of the targeted audience.

In the original paper publication [26], the guidelines were already designed as a decision tree. This format was chosen to better accommodate their further transcription into a computerized version. In this version, the decision chart of the consultation reflects the diagnostic elaboration of the physician when confronted with a traveller coming back with fever. As in other decision support systems [7], the program highlights history, physical and laboratory items which are potentially useful in discriminating among the diagnosis under consideration. It ends with a differential diagnosis, propositions for targeted laboratory investigations and appropriate management of the patient. The study prototype website enables the possibility to record (i) the precise pathway used by the physician through the decision chart, (ii) the laboratory tests performed, (iii) the initial and final diagnoses as well as the outcome and (iv) the reasons for non-adherence when the physician diverges from the proposed approach. The ultimate goal will be to provide an update and to tailor the guidelines for end-users.

4. System description

4.1. *Architecture of the consultation website www.fevertravel.ch*

The consultation website, www.fevertravel.ch, comprises several features (Fig. 1): (i) a general presentation of the purpose, content and restrictions of the website, (ii) an interactive decision chart providing the clinical recommendations, (iii) a case summary that can be printed and (iv) a menu providing links to several domains, namely a list of the authors and panel members, a literature review, a literature reference list, a description of the guidelines' development, a disclaimer, an up-to-date document describing country-specific distribution of infectious diseases, a contact e-mail address and a list of links to websites useful for travel medicine.

4.1.1. *Decision-tree*

The decision tree begins with questions focussing on travel destination, as well as dates of departure and return, and date of the symptoms onset. This information is needed to

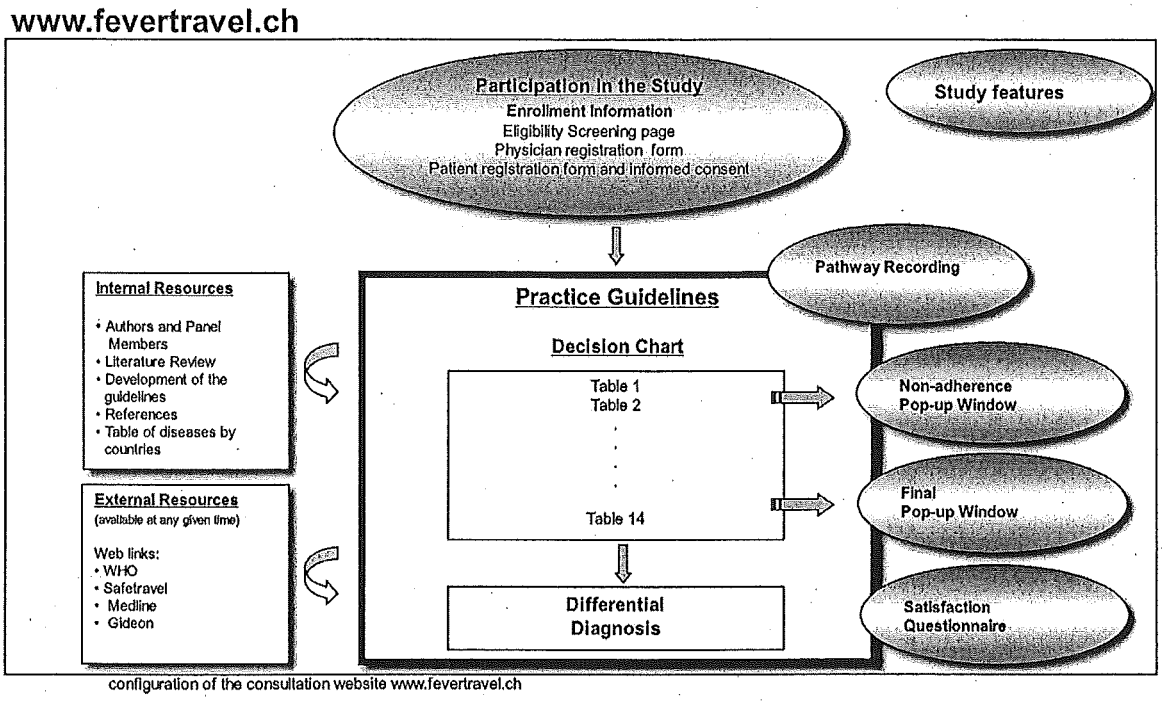


Fig. 1 – Architecture of the consultation website www.fevertravel.ch.

restrict later on the differential diagnosis based on the incubation periods of illnesses. The following step 'danger signs', looks for items in the history or in the clinical examination that could be rapidly fatal and might require immediate action (treatment, hospitalisation). The next step uses questions to highlight specific points of the history, specific symptoms or signs, as well as one laboratory result (eosinophil count) useful to discriminate among the diagnosis under consideration. Each of these specific questions, if answered positivly, leads to one specific figure where possible diagnoses and approaches are suggested (Fig. 2). The physician is then invited to navigate through the various selected figures. There is a link on each mentioned disease referring to its endemic zone, that is automatically compared with the countries visited. Time conditions referring to the possible incubation time for a disease are mentioned, and are compared with the times of travel given earlier. In addition, diagnostic tests are proposed for various situations, for which results are expected to be obtained in a timely fashion. At the end of a case, a management strategy is suggested if there is no documented diagnosis.

4.2. *Architecture of the research prototype website www.fevertravel.ch*

All users of www.fevertravel.ch are informed about the existence of the study in one of the introductory pages, and are asked whether they would like to register.

The research prototype contains additional features superimposed on the basic structure of the consultation website to collect data online. The additional features for registered physicians include: (i) an online registration form, including personal details, e.g. e-mail address, name, office address, (ii) a personal member page (Fig. 3), where all cases included by this user are listed, identified by an anonymous ID code, sex, year of birth, country of origin and keywords allowing physicians to have an overview of all their registered cases, (iii) a page recording basic patient demographic characteristics (sex, year of birth, country of origin) and symptoms suggesting fever (Fig. 4) and (iv) a window requesting the working diagnosis after the first consultation, and suggesting a clinical management strategy for the following days (Fig. 5), (v) a "final box", where follow-up information about final diagnosis and outcome are recorded (Fig. 6).

To record reasons for non adherence to the decision chart, a window called "non-adherence pop-ups" appears on the screen every time the physician chooses not to follow the recommendations. In this window physicians are invited to detail whether their reasons for non-adherence was due to an alternative documented diagnosis or another reason that would be explained in a blank text field. (Fig. 7).

The final box cannot be submitted until 14 days after the first consultation in order to have a minimal follow-up period during which most complications are likely to occur. To minimize the loss of follow-up, automated e-mails are sent to the physician to remind him to complete and submit his case after 14 days. This mail contains a direct link to the final box of the patient that must be completed. The final box also asks qualitative questions about the website, to evaluate physicians' impression on the ease of navigation through the website and on the usefulness of the recommendations.

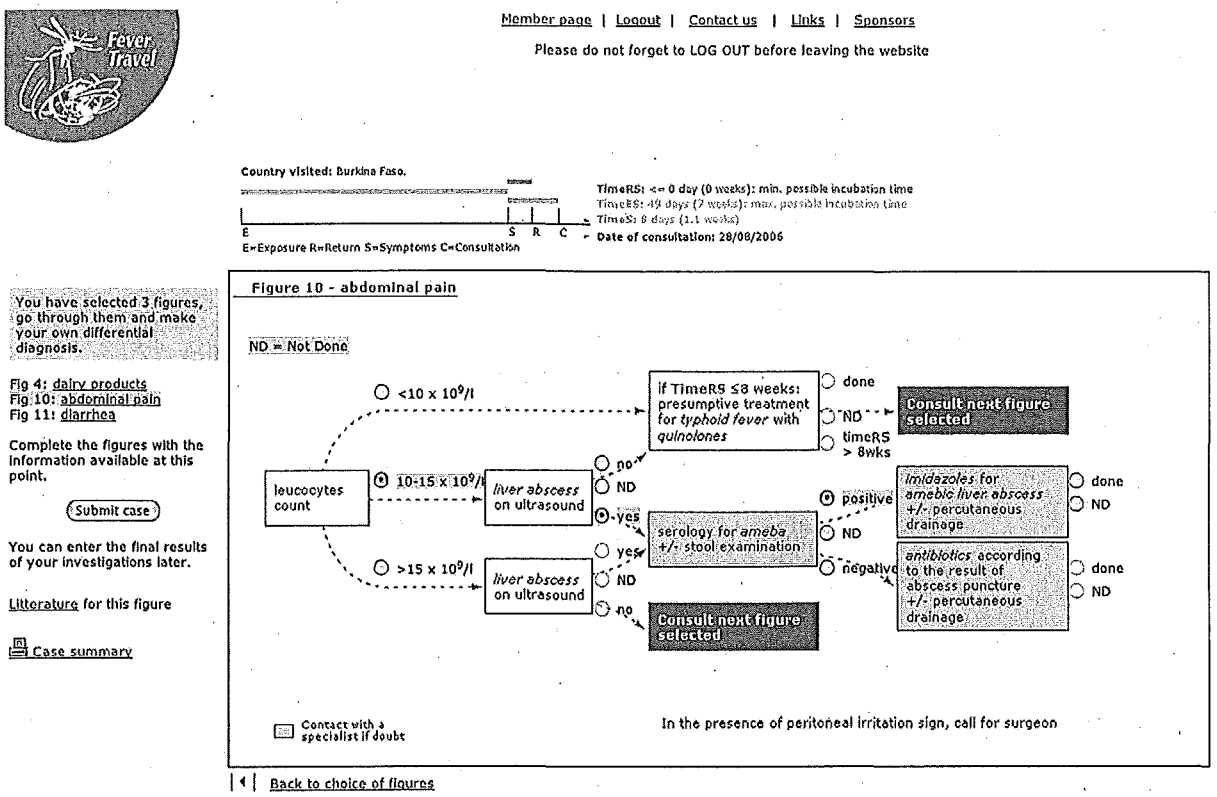


Fig. 2 – Screen for diagnoses and approaches suggested for the management of abdominal pain.

4.3. *Description of the computerized system used*

We provide here the technical description of the website through three main viewpoints: the client, the server and the database.

4.3.1. *The client*

Data is displayed using HyperText Markup Language (HTML) and Cascading Style Sheets (CSS). The client scripting language chosen is JavaScript. This language is very common and allows full control of the document. It can also be useful for enabling or disabling input fields (for example, text fields, buttons, drop-down menus, or checkboxes) or for checking and validating information entered by the user.

Caution has been taken to avoid browser-specific HTML/CSS tags or JavaScript functions, ensuring proper display and navigation with any modern browser. Our website has been successfully tested on Internet Explorer and Mozilla (Netscape).

4.3.2. *The server*

The PHP scripting language is used on the server. It is an open-source, free to use and to download language. Further, it supports many databases and can be used on many platforms and servers. PHP is used to analyze requests made by the client. According to the type of request (e.g. navigating through the site or submitting information to be saved), PHP scripts create and send HTML pages to the browser and/or save information into the database.

The scripts also manage the automatic e-mails sent to the physicians. E-mails are sent in case of registration, lost password or to remind the physician that one of his/her patient's cases needs to be completed.

4.3.3. *Database*

The MySQL *Relational DataBase Management System* (Fig. 8) is used to store information. It is free to use and to download. Our database is structured into 13 tables (physicians, patients or diseases, etc.). Each table has the option to have a certain number of columns and rows, row entries corresponding to separate records, and columns to variables (e.g. age, sex or ID of the physician in charge in the patients' table). The various tables of the database contain the information relevant for a specific patient registered in the study, and also basic information needed for the functioning of the website, such as the geographical distribution of various diseases.

4.4. *Data management and analysis*

The MySql relational database is not managed directly. Instead, the MySql administration tool named phpMyAdmin is used. It is a user-friendly tool for data manipulation, suitable even for users with minimal computer knowledge. It is very convenient for the day-to-day follow-up of the study by the investigators. However, for data analysis, we preferred to work with a linear database, where one variable corresponds to one very specific question. We converted the information into numeric values whenever possible. A script was there-

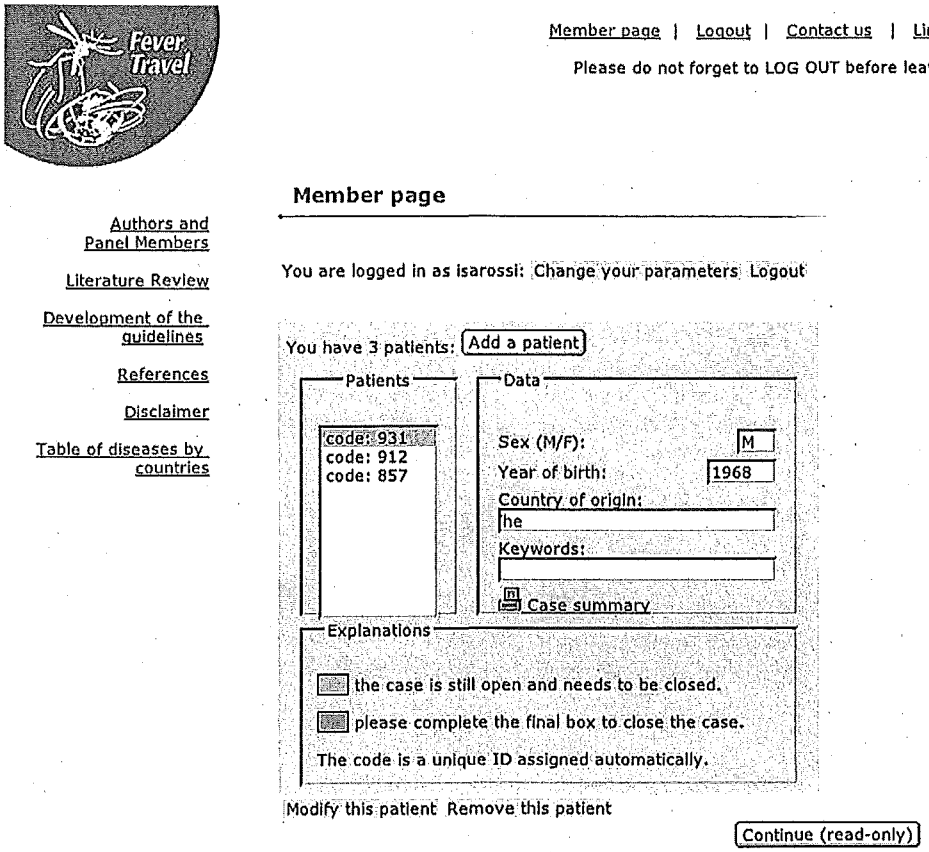


Fig. 3 – Screen for personal member page.

fore created to translate the relational database into a linear database. As an example, all of the information from the buttons ticked in a figure relating to a specific item of the history or clinical examination for one patient were coded as one variable in the MySql database, but they were further transcribed into five variables in the Stata database. The statistical software used for the final analysis is STATA 8.0.

The pathway used by the physician for a particular patient is composed of several steps (one step for the "danger signs", and one step for each selected figure). These features will be used in the analysis. For instance, possible adherence values for each step "adherent", "non-adherent", or "incomplete" will be measured. Adherence to the guidelines will be evaluated on one side in terms of overall adherence by the physician for each particular patient ("physician/patient pair"), on the other side in terms of the adherence to each step in the pathway. A first value of "crude" adherence will be given by the percentage of physician/patient pairs choosing to have a different approach than the one suggested. This first measure will then be reevaluated by looking at the reasons given for non-adherence, and further classified as "acceptable" or "non-acceptable" non-adherence. Criteria for this subjective decision-making will be discussed and standardized among several experts. These values will then be compared to outcome information, and a judgment will be made about the safety of the guidelines. The feasibility of the guidelines used will be evaluated by estimating the proportion of incomplete data, which should be analyzed for each step. It might, however, prove difficult to separate true missing data from data missing due to partial drop out. Useful information will also be retrieved by estimating how many times each selected figure is used. Finally, some more specific qualitative questions will be asked in the final box.

4.5. *Interactivity of the website*

Our study model provides an opportunity for clinicians to interact with the computer in a way that supports real-time clinical decision-making. Physicians base their diagnosis and the clinical management of their patients on destination, chronology of the trip, travel history, danger signs and a checklist of a few relevant symptoms and signs. Data is collected, recorded, and stored in real time while physicians are surfing through the guidelines. All of these characteristics fulfil one of the main goals of studies over the Internet, to save time and respect clinical workflow.

Besides patient's data retrieval at registration and at the beginning of the decision tree, the website includes numerous interactive elements that allow for a better understanding of the recommendations, provide complementary tools helping the user in his choices and help to adapt the recommendations to the particular situation of the patient:

- In the first part of the decision tree ('danger signs'), a new question is provided only after an answer has been given to the previous one. The cascade of questions is different depending on the answer given to the question (e.g. malaria investigation strategy and treatment is given only if 'yes' is answered to the question: 'travel in an endemic area ?'). The different branches of the decision tree are, however, connected together at several points. The different questions with their answers cumulate on the same page, which helps to maintain a constant overview of the medical situation of the patient and allows changes at any time thanks to a 'back' button.
- In the next part of the decision tree (specific conditions describing the medical situation of the patient), the program provides only the selected figure(s). The latter are presented in parallel and not in series, in order to facilitate constant navigation between them, which is essential for the physician to be able to construct his/her differential diagnosis, reflecting the process of a physician's mind weighing different hypotheses and following various pathways at the same time.
- To allow the user to modify the pathway followed in the decision tree at any time (except after closure of a case). This is accomplished with a complex system of checking old versus new data, and overwriting if different responses are clicked, that takes into account all links between the different levels of the decision tree.
- A clinical summary is provided for the physician each time a case is submitted. This document, designed for easy reading once printed, integrates all elements selected during navigation to provide a differential diagnosis with the corresponding clinical approaches (investigations or treatments).

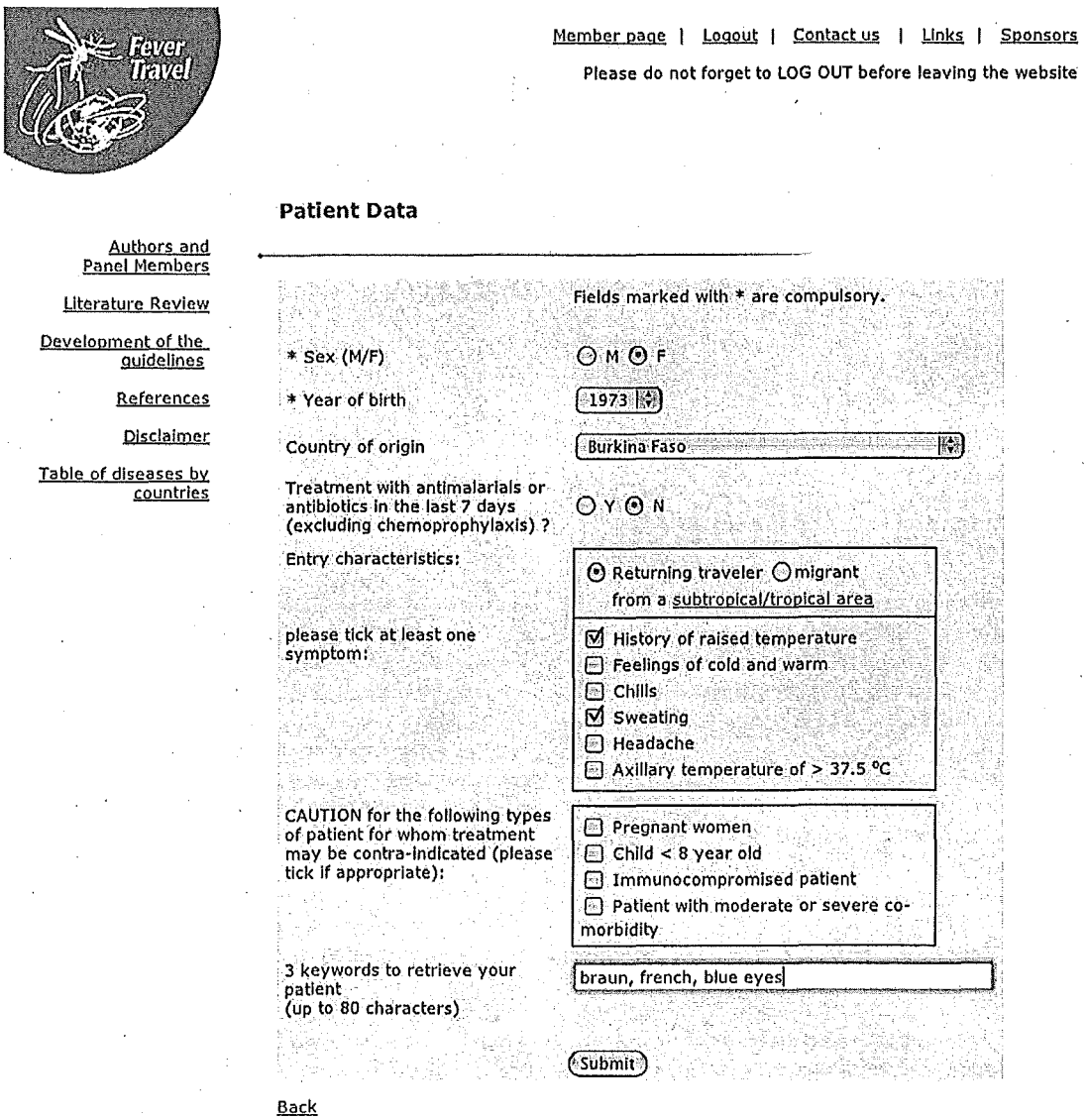


Fig. 4 – Screen for recording basic patient demographic characteristics and symptoms of fever.

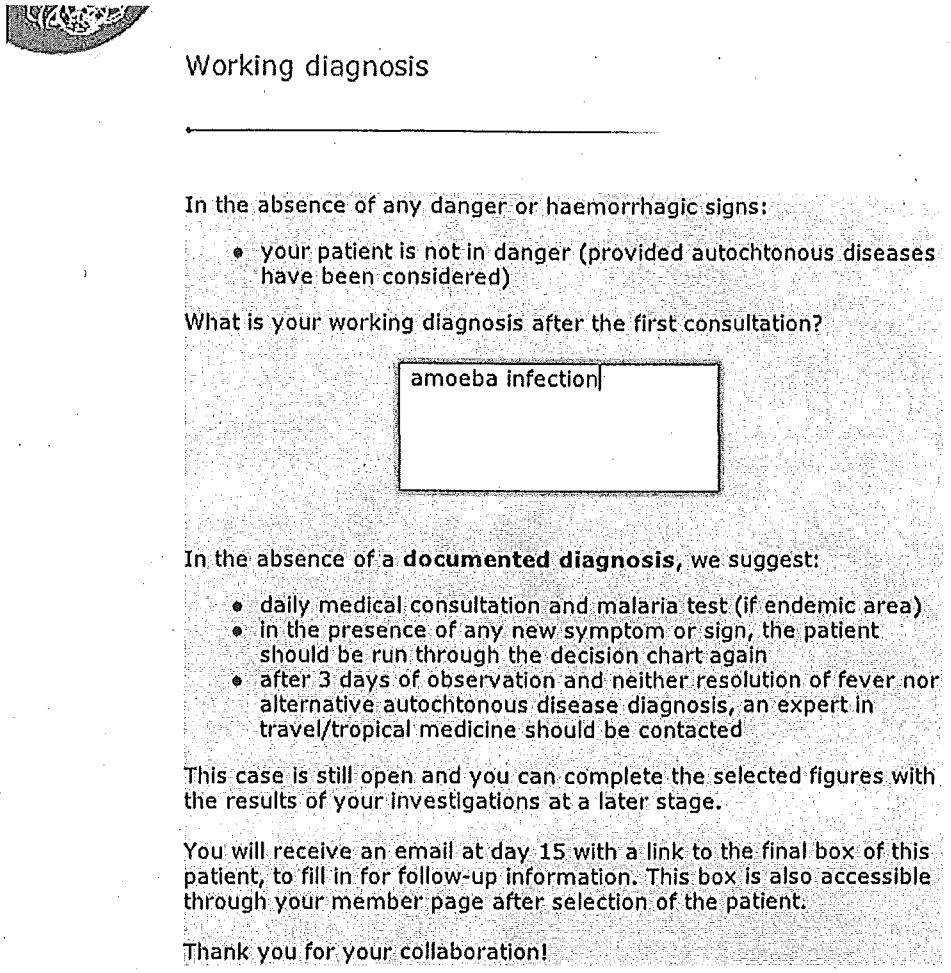


Fig. 5 – Screen for working diagnosis.

4.6. *Control mechanisms*

Recruitment: Recruitment has been simplified as much as possible by a strategy allowing quick and easy registration for any physician with Internet access. Physicians working in diverse settings all over the world can thus be recruited. By this process, we hope that the population of registered physicians will be as close as possible to our target audience for the guidelines. However, because sampling and representativeness are acknowledged limitations of Internet-based surveys, it will be difficult to avoid some form of selection in the participating physicians.

Participants' (physicians) authentication (Fig. 9): Personal data such as name, office location, phone number and e-mail are requested. The e-mail address is checked right away with an e-mail forwarded from the data collecting system. A physician's registration is considered invalid if he has not validated his/her e-mail, and his/her recorded data will not be included in the analyses.

Confidentiality and security (Fig. 4): Patient data are anonymous. The only personal characteristics serving to identify patients are sex, year of birth, and country of origin. Each physician has his/her own password that allows him to reach his/her member page where all his/her cases are registered. If the password is forgotten, a new one will be sent to his/her mail box. This system guarantees personal access to the study and avoids anyone being able to gain access under a colleague's name. Access to the database is also password-protected and thus only possible for the main investigators of the study.

Informed consent (Fig. 10): Written informed consent slows down the progress of trials over the Internet [3]. To avoid this problem, we included an informed consent screen in the online registration process. The physician is not allowed to include his/her patient if he does not tick the corresponding button, and is otherwise automatically channelled to the consultative website, where patient data is not registered.

Automated reminders: They are useful for the efficient conduct of trials over the Internet [3,28,29]. They help to improve the quality of the data and to minimize the risk of drop out. Our website has a time-sensitive code that sends the appropriate questionnaire to be completed by automated e-mail to the physician. Physicians just have to click on a link within the e-mail to directly open the page to be completed.

Final box

print

Patient ID: 931
Year of birth: 1968
Sex: M

Follow-up questionnaire, to fill in at day 15:

- What is your final diagnosis?
  Shigellosis
  Is this a ○probable ◉documented diagnosis ?
  how (investigations done)?:
  Stool culture
- Have there been complications? ○yes ◉no
- Has your patient been admitted? ◉yes ○no
  Reason for admission?
  Blood in the stool
  Length of stay (nb of days)? 5
- Treatment given?
  Ciprofloxacine
- Final outcome of your patient (please tick one):
  ○not yet known
  ◉recovered
  ○sequelae
  ○death
  ○lost to follow-up

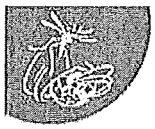
In your opinion, did the guidelines help you in reaching the final diagnosis ?
◉yes ○no

Considering the number of investigations done, do you think you would have performed
○more ○less ◉the same number of investigations had you **not** used the guidelines?

Did you consult a specialist in tropical/travel medicine?
○yes ◉no

For you, what was the worst thing when using these guidelines? (less then 80 characters)

Fig. 6 – Final screen.



Please fill in this form

Other documented diagnosis (please specify which one)

Other reason (please specify, up to 80 characters)

other treatment

Submit and close

Fig. 7 – Window for "Non-adherence" explanation.

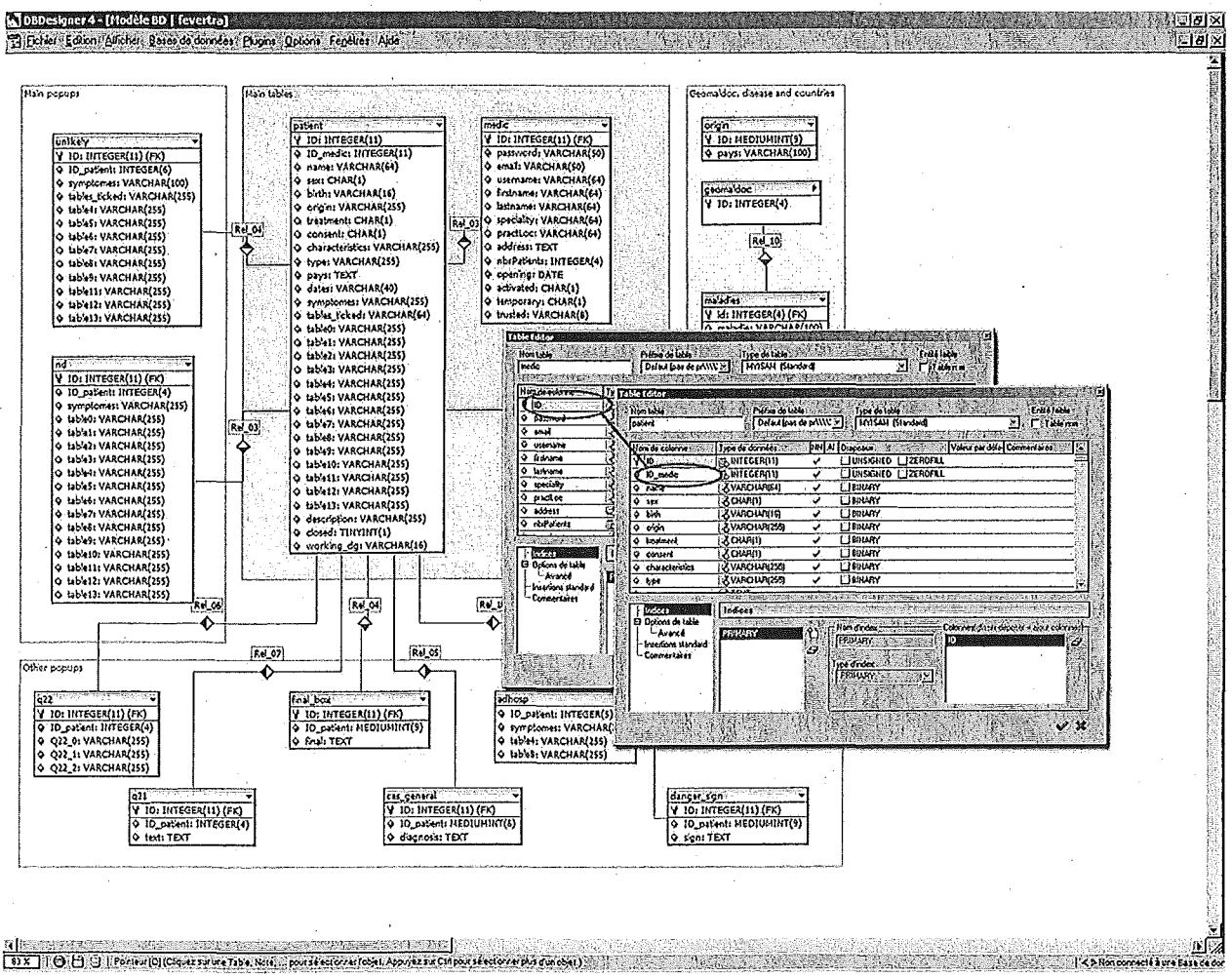


Fig. 8 – MySQL relational DataBase Management System.

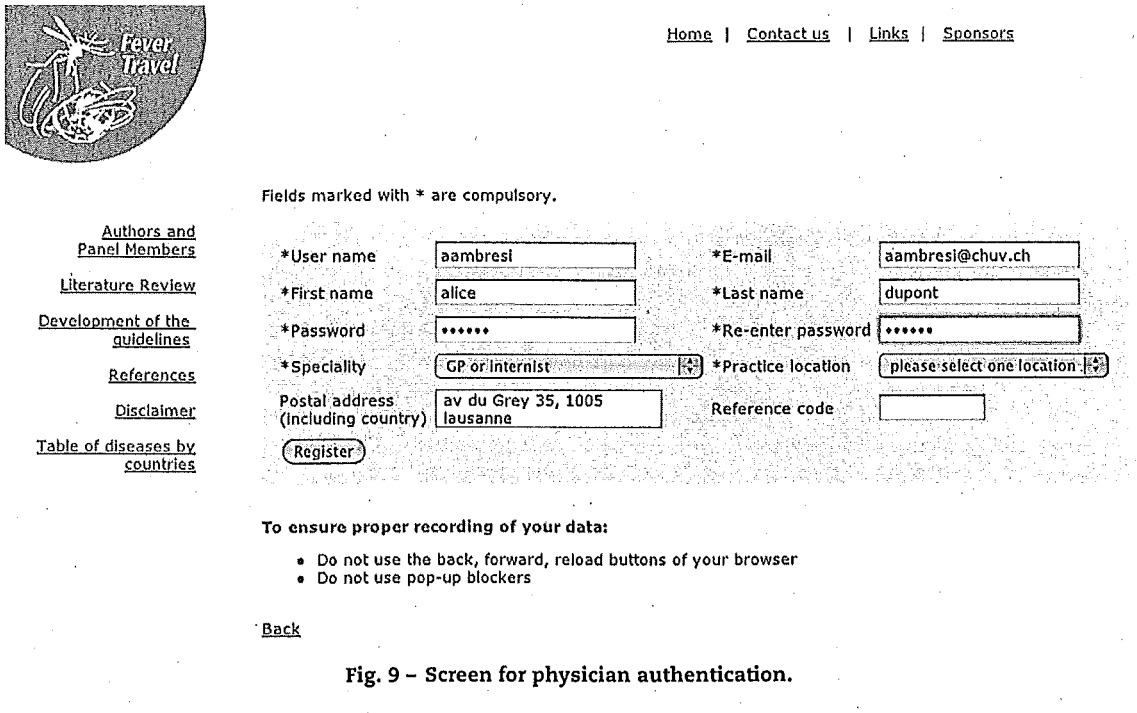


Fig. 9 – Screen for physician authentication.

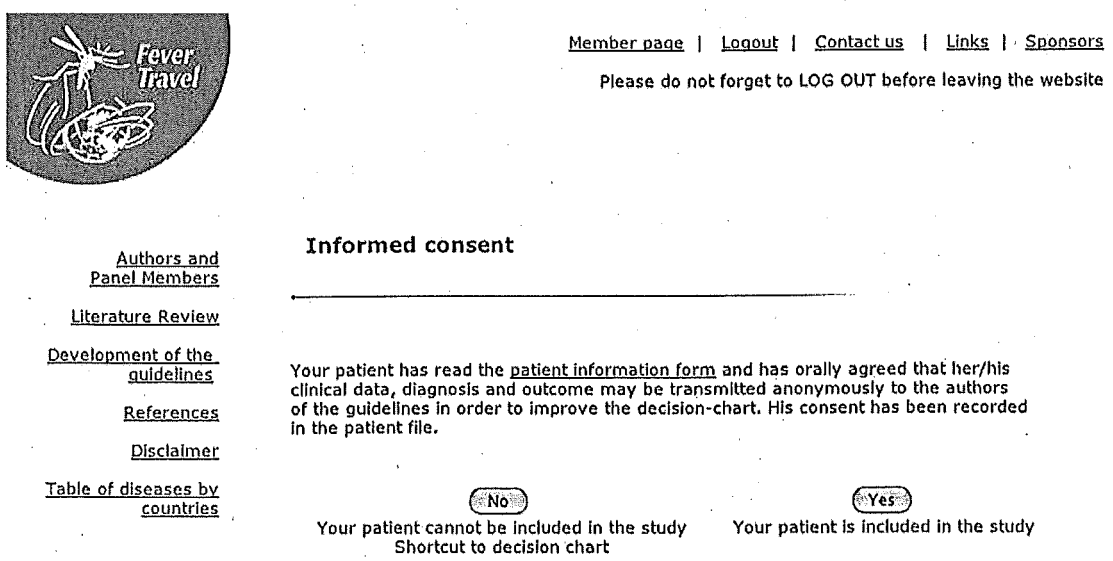


Fig. 10 – Screen for informed consent.

5. Status report of the study prototype

5.1. *Testing the prototype study website*

After finalizing the website construction, we tested our prototype against established standards to run Internet studies [16].

5.1.1. *Pre-test for clarity and availability on different platforms*

The development process of the online research prototype started in parallel with a pilot-testing phase offline in our Medical Outpatient Clinic (October 2003 to October 2004). The aim was to test the appropriateness of the chosen method of data collection and to evaluate implementation barriers. The resident physicians were asked to use the first version of the website for all their patients presenting with fever upon returning from the tropics (travellers or migrants). At the same time they were asked to complete a paper questionnaire that was designed to mimic, as much as possible, the future online study. The latter contained the decision tree, a page recording the patient demographics, the outcome of the patient, and a questionnaire listing pre-specified categories of reasons for non-adherence to the guidelines to be completed by physicians who did not follow the proposed approach. This

pilot-study helped us to get a sense of how the physicians were using the guidelines. In particular, the list of pre-specified reasons for non-adherence was abandoned, as the mentioned reasons were too diverse. Preparation of the online study prototype together with pilot-testing the system offline was a dynamic process, often driven by a "trial-and error" approach. This was time-consuming, but allowed for the development of a tool that was targeted to the users (physicians) and adapted to the study population (cases).

Based on the results of the pilot paper study, the computerized version of the research prototype was developed. After inclusion of the first 100 cases, further refinements and adjustments were made according to the feedback of the pilot-users. Many technical problems that had gone unnoticed during the preparation phase were identified and solved [e.g. items developed using one server (Explorer 6) that did not work on previous versions of the same server (Explorer 5)]. Moreover, the availability on different platforms has been verified through testing the website on different servers.

5.1.2. *Drop outs and security check*

The check for configuration errors of the website has been tested extensively during the pilot-study by different users using different operating systems, with different levels of computer knowledge.

We decided to have two different levels of recruitment using a multiple site entry system to avoid self-selection of users. *Level* 1 includes physicians that have been contacted nominally, and working in selected primary care centers or hospitals in the six continents. This should ensure inclusion of cases coming from different settings and from all around the world. *Level* 2 includes all physicians who want to participate. They will find our website either directly through advertisements in medical conferences or teaching meetings, or through websites harboring a link to www.fevertravel.ch [27]. The majority of the latter are at the moment medical websites aimed at general practitioners and travel/tropical medicine practitioners. As physicians have to indicate where and in which type of setting he/she is working, as well as his/her professional background, we should know which population of physician/setting we are dealing with. This will allow us to put in perspective the results obtained in this group of physicians and results will be presented separately from those given by the previous group. In parallel with the web-based prototype development, we tested our study design off-line using a paper version mimicking the online version, and then online via the computer network of the institution.

The E-mail reminder sent automatically 2 weeks after the day of inclusion, with a second identical e-mail 2 weeks later in the absence of response, should help to avoid dropouts. If the physician still does not answer, we will contact him/her personally and ask for feed-back.

To lower the dropout rate the program requests personal information from the physician. We hope that the interest of getting a complete differential diagnosis and a printed summary of the patient's main observations at the end will represent a sufficient incentive not to stop in the middle of the pathway. Regular data archiving takes place in our institution on the main server of the hospital.

5.2. *Limitations of the study prototype*

Any physician in the world with access to the web can participate in the study. A limitation encountered with the prototype concerned the log-in system: it is theoretically possible for anybody to log-in and alter the study results by introducing irrelevant information. The inclusion of physicians working in pre-selected outpatient centres and hospitals who are registered and attributed an identification code should reduce this potential risk. Additional limitations include the sampling and selection of participating physicians and patients, as well as dropouts [30–32]. Although, we will try to get broad participation of centres, by its nature it will not be possible to closely control the participation of physicians who register individually. Security checks will always be run to verify physicians' identity. Also, analysis will be conducted separately for those pre-registered and those connecting on the website without prior identification.

6. Lessons learned

The consultation website has been visited more than 13,000 times from its launch in May 2003 to December 2005. There is a clear increase of consultations after active promotion in international meetings. We hope to target more users by publishing the development process and the first results of the pilot-study.

As far as the study website is concerned, the analysis of the first 350 physician/patient pairs recruited from April 2003 to December 2005 shows that the computer system allows recording of the desired items. Two thirds of the cases have been included by primary care physicians working at the Medical Outpatient Clinic in Lausanne. The others originate from other parts of Europe, mainly Belgium, Holland and Spain. Preliminary results already allow for identification of areas in need of improvement, i.e. where the recommendations are followed by approximately 50% of the users.

Implementation of the web-based guidelines into routine practice at the Medical Outpatient Clinic and first assessment of the process showed more systematic procedures and management of patients returning from tropical countries with fever. When resident physicians discovered the online prototype, their interest for tropical/travel and evidence-based medicine increased considerably, and hence their knowledge increased as well; this also applies to the concept of evidence-based medicine. They became increasingly independent from the more senior residents and decreased the sluggishness of the usual procedure. Often they could reach a working diagnosis prior to discussing the case with the registrar or the consultant, which brought them huge satisfaction.

A growing number of physicians are interested in using the Internet as a medical teaching tool either for pre- or post-graduate training [7,28]. To meet training expectations, educational websites need to apply principles of effective learning. We followed key practical steps in such website development, i.e. needs assessment, evaluation of pre-existing software, interdisciplinary enterprise, use of active learning and pilot-testing before implementation. This ended with a product that is highly appreciated by the pre- and post-graduate physicians

from our clinic when used in interactive teaching sessions. To our experience it brings rigour in travel and medical history taking, and highlights the key items to check during the physical examination in order to narrow the differential diagnosis.

The development of such computerized guidelines with a research component is a long process that required a large body of expertise, from clinicians to website masters and designers. The value of the Internet approach for dissemination of the guidelines and evaluation of their feasibility needs to be acknowledged by public health leaders and funding agencies, so that adequate financial resources can be allocated for such development in the future.

7. Future plans

The immediate step is to recruit as many physician/patient pairs as we can through the study website, so that our guidelines can be assessed in different primary care contexts and countries. This online tool, if sufficiently used, could offer the unique opportunity of a 'global' study that would allow a reliable assessment of the usefulness and appropriateness of the computerized guidelines for target users originating from different horizons. When analysis of the data highlights places along the decision chart where the proposed approaches are inappropriate, or not feasible, we will revise and update the guidelines so that they can be tailored as best as we can to the end-users. If this is achieved, we would anticipate improvement of the quality of care provided to travellers coming back with fever.

Conflict of interest

None declared.

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