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Prevention and assessment of infectious diseases among children and adult migrants arriving to the European Union/European Economic Association: a protocol for a suite of systematic reviews for public health and health systems

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ABSTRACT

Introduction The European Centre for Disease Prevention and Control is developing evidence-based guidance for voluntary screening, treatment and vaccine prevention of infectious diseases for newly arriving migrants to the European Union/European Economic Area. The objective of this systematic review protocol is to guide the identification, appraisal and synthesis of the best available evidence on prevention and assessment of the following priority infectious diseases: tuberculosis, HIV, hepatitis B, hepatitis C, measles, mumps, rubella, diphtheria, tetanus, pertussis, poliomyelitis (polio), *Haemophilus influenza* disease, strongyloidiasis and schistosomiasis.

Methods and analysis The search strategy will identify evidence from existing systematic reviews and then update the effectiveness and cost-effectiveness evidence using prospective trials, economic evaluations and/or recently published systematic reviews. Interdisciplinary teams have designed logic models to help define study inclusion and exclusion criteria, guiding the search strategy and identifying relevant outcomes. We will assess the certainty of evidence using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach.

Ethics and dissemination There are no ethical or safety issues. We anticipate disseminating the findings through open-access publications, conference abstracts and presentations. We plan to publish technical syntheses as GRADEpro evidence summaries and the systematic reviews as part of a special edition open-access publication on refugee health. We are following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Protocols reporting guideline. This protocol is registered in PROSPERO: CRD42016045798.

Strengths and limitations of this study

► Explicit, transparent and trustworthy review method.
► Pragmatic approach builds on existing systematic reviews and permits de novo reviews when warranted.
► International team with guideline, Grading of Recommendations Assessment, Development and Evaluation migrant health, and infectious disease experts.
► There will be less emphasis on synthesis of local and contextual data in this portion of the project.
► Synthesis of data from various systematic reviews will require close focus on research questions.
► Updates and de novo synthesis will need to focus on the most substantive evidence gaps.

INTRODUCTION

The increase in refugees and other migrants from low-income and middle-income countries (LMICs) to the European Union/European Economic Area (EU/EEA) since 2011[1] has made the development of infectious disease guidance a public health priority for EU/EEA Member States. High mobility, poor living conditions, barriers to accessing healthcare and potential public health risks for newly arriving migrant populations and host populations are leading public health concerns. As a result, the European Centre for Disease Prevention and Control (ECDC) called for evidence-based guidance to support tailored public health approaches to health

assessment (voluntary screening) and prevention (vaccination) among newly arrived migrants. This guidance aims to support public health and health system professionals to screen and treat international migrants.[2]

Migrant populations include economic migrants, refugees, asylum seekers and irregular migrants who may have been forced to flee conflict, natural disasters or economic peril.[3] For the purposes of this evidence-based project, we define the target migrant population using health risk associated with recent arrival (eg, within 5 years of arrival in EU/EEA), country of origin, gender, and unaccompanied minors and other circumstances of migration.[3] Scoping literature reviews and a consensus meeting in Stockholm have selected a series of infectious diseases for systematic reviews: tuberculosis (TB) (active and latent), HIV, hepatitis B, hepatitis C, measles, mumps, rubella, diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b, strongyloidiasis and schistosomiasis.

Infectious diseases endanger the health of both migrant and host populations. Interventions targeting both public health and health systems levels are needed to address these threats. The Migration Integration Policy Index health system survey showed that policies and programmes relevant for migrants are underdeveloped in many European countries.[2] Key challenges identified by the survey include inadequate entitlements to healthcare, poor accessibility of services, lack of responsiveness to migrants' specific needs, absence of interpretation services and lack of local health professional training.[4]

For decades, public health programmes have played an important role in assessing migrants for infectious diseases. Historically, port-of-entry approaches met ships on arrival and conducted screening and quarantine programmes.[5] In recent decades, the sheer number of migrants and diverse modes of travel have reduced the effectiveness of this approach.[6] Evidence from a series of evidence reviews in Canada on recent migrants showed that age, gender, forced migration and migrant country of origin often modified disease risk and helped guide assessment and prevention priorities.[3] Evidence from international migrant health reviews have begun to influence public health policy and primary health clinical assessments, as seen in Ireland, Canada, Australia and the USA, for example.[3 5–7]

The objective of this suite of systematic reviews is to guide the identification, appraisal and synthesis of best available quantitative and qualitative evidence on prevention and assessment (voluntary screening) of priority infectious diseases. This protocol follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Protocols (PRISMA-P) guideline.

RATIONALE
The ECDC has invested in systematic reviews of public health voluntary screening and prevention for newly arriving migrants.[8 9] Systematic reviews play an important role in synthesising evidence to address important questions in health and social programmes. Using standardised methods, review findings can contribute to new recommendations, trustworthiness of existing evidence and the identification of gaps in knowledge. Systematic review protocols serve as explicit and transparent templates for the final review. Protocols minimise bias by determining the content of the process and content of the review. Publishing the protocol demonstrates to the reader that the methods have been thought out in advance and provides the reader with an opportunity to confirm the authors made critical decisions a priori.[10] Following the protocol accordingly and performing the review properly will identify the effects of interventions on the benefits and harms of health assessment (voluntary screening, treatment and vaccine prevention) in migrants. Below, we provide context overviews of each selected infectious disease; additional details on rationale, key questions and logic models for each infectious disease review can be found in the online supplementary appendices.

Tuberculosis
TB causes significant morbidity and mortality in high-income countries. Migrants from high TB incidence countries account for the vast majority of the TB case burden.[1 11 12] Migrants originating from intermediate and high TB incidence countries are at increased risk of exposure to TB and increased risk of developing active TB.[6] Individuals and overcrowded populations exposed to TB have an increased lifetime risk of developing active TB through reactivation of latent TB infection (LTBI) after arrival. Screening and treatment of active and latent TB are often components of TB control and elimination strategies. Most Western European countries screen migrants for active TB on or soon after their arrival. However, for the migrant groups targeted, the TB incidence in migrant source countries and the setting vary.[13–16] The effectiveness and cost-effectiveness of these strategies are unclear. Given the relatively low yield of active TB screening programmes, there is a growing interest in latent TB screening and treatment for migrants to prevent the development of active TB.[17] It is also unclear which migrants may benefit from LTBI screening and treatment and what would be the impact on health system's resource use and costs. The ECDC continues to work on TB elimination strategies and these include screening guidance[17] (see online supplementary appendix 1, supplementary appendix 1 figure 1 and supplementary appendix 1 figure 2).

HIV
By the end of 2014, approximately 36.9 million people were living with HIV and/or AIDS, 2.6 million of whom were children under the age of 15 years. Sub-Saharan Africa bears the largest burden of HIV, where the number of HIV-infected people had reached 25.8 million in 2014[18] and only 54% of infected people were aware of their positive status for HIV. In the same year, 1.2 million persons

around the world died due to HIV-related causes. In 2014, almost 30 000 people were diagnosed with HIV in EU/EEA Member States, a rate of 6.4 cases in every 100 000 people.[19] In the EU, an estimated 30% of people living with HIV are unaware of their HIV infection.[20] This is thought to be mainly due to the low uptake of and access to voluntary HIV testing and counselling. HIV is disproportionately prevalent in LMICs, and thus refugees and other migrants coming from HIV endemic countries are at increased risk for this infection. The stigma attached to HIV and the potential for exclusion from immigration by some countries pose additional barriers and concerns for the migrants. Migrants face fears of HIV transmission, and impact of seropositive status on family, community and individual/family costs, including loss of work time related to screening and treatment. This fear and stigma forces migrants to avoid HIV testing and to seek treatment.[21 22] There is a need for evidence-based guidance for screening approaches and treatment of migrant populations coming to the EU/EEA from HIV endemic areas (see online supplementary appendix 2 and supplementary appendix 2 figure 1).

Hepatitis B

Hepatitis B virus (HBV) infection is an important global health problem that affects an estimated 240 million people worldwide and approximately 13 million in the WHO European region.[5 23] Chronic HBV infection is frequently asymptomatic, but 20%–30% of patients with chronic hepatitis B (CHB) will develop complications, including liver cirrhosis and hepatocellular carcinoma (HCC). These complications result in 650 000 premature global deaths annually.[24–26] An effective vaccine for hepatitis B has existed for several decades. In addition, new treatment options are increasingly effective at reducing the incidence of cirrhosis and HCC in patients with CHB.[6] Although global vaccination rates have increased, the prevalence of CHB remains high in certain LMICs.[7 26] Migrants to EU/EEA carry a disproportionate burden of CHB-related morbidity and mortality. Practices in screening and treatment for hepatitis B vary by country across Europe, with no standard EU/EEA guidance for screening, vaccination and treatment.[24] Impact on resource use and costs varies by country. Studying the effectiveness of screening and developing appropriate guidance for hepatitis B in migrants to Europe for whom to screen, vaccinate and treat are a priority for migrant health (see online supplementary appendix 3 and supplementary appendix 3 figure 1).

Hepatitis C

Worldwide, between 120 and 170 million people are living with hepatitis C virus (HCV), with 15 million in the WHO European region.[24] HCV is the leading cause of chronic liver disease, end-stage cirrhosis and liver cancer.[6] It is estimated that between 2 and 6.6 million individuals in the EU/EEA are infected with chronic HCV. HCV is one of the leading causes of chronic liver disease and cirrhosis,

and the most common indication for liver transplantation in most European countries. Patients in early stages of the disease are generally asymptomatic, and therefore most patients present in the late stages of HCV disease, when treatments are less effective and complications or death are unavoidable.[27] In recent years, highly effective but very expensive curative treatments have emerged. Early diagnosis and treatment may limit the burden of the disease in the EU/EEA, for example, screening migrants when HCV prevalence in their countries of origin is higher than those of European settlement countries.[28] Defining high prevalence regions and determining the effectiveness, acceptability, cost and affordability of screening and treatment from both an EU/EEA migrant and a public health perspective are necessary (see online supplementary appendix 4 and supplementary appendix 4 figure 1).

Vaccine-preventable diseases (measles, mumps, rubella (MMR vaccines), and diphtheria, tetanus, polio and pertussis, *Haemophilus influenzae* type b (DTPP-Hib vaccines))

In 2011, evidence-based clinical guidelines for migrants and refugees recommended vaccination for all adult immigrants without immunisation records with one dose of measles, mumps and rubella vaccine, and a primary series of tetanus, diphtheria and polio vaccines, to reduce associated morbidity and mortality.[6] For children, the guidelines propose age-appropriate vaccination for those with absent or uncertain vaccination records.[6] The low cost of vaccination is strongly favoured against potential morbidity and mortality costs associated with measles complications, congenital rubella syndrome, tetanus and severe pertussis in infants.[29–33] Despite this recommendation, engaging migrant populations in preventative health services remains a challenge. Factors include barriers to accessing healthcare, lack of health coverage in public programmes, inability to obtain private health insurance and documented immigration status, among others. Organisational barriers include availability of interpreters and cultural mediators, hours of operation, lack of information regarding services provided, as well as geographical and transportation challenges.[34] Individual-level barriers that include social isolation and lack of support networks, cultural aspects of belonging to an ethnic group, language barriers and discrimination were factors that migrants identified as making them vulnerable, hindering access to care.[34] This review will synthesise evidence on safety, resource use including type of personnel (eg, nurses and health workers) and models of administering vaccinations, cost and implementation for EU/EEA (see online supplementary appendix 5 and supplementary appendix 5 figure 1).

Intestinal parasites

Schistosomiasis and strongyloidiasis affect between 30 and 250 million persons in endemic regions. The health impact of these neglected intestinal parasitic diseases has recently gained prominence due to increased global migration and resettlement. For example, strongyloidiasis

and schistosomiasis both have the peculiarity of leading to severe chronic infections years after leaving endemic regions. Strongyloidiasis may be life-threatening in immunocompromised patients, and schistosomiasis may lead to chronic and fatal complications such as cancer. The rates have significantly increased in previously non-endemic regions.[6] *Schistosoma haematobium* can infest bodies of water in Southern Europe where intermediate competent host Bulinus (molluscum) is present. This could theoretically lead to foci of transmission in the EU.[35] Thus, there is a need to provide evidence-based guidance for voluntary testing and treatment that will reduce morbidity and mortality in high-risk migrant populations, in order to reduce transmission and out-of-pocket and health system costs, and to prevent the transmission of the infection. Defining high prevalence regions and determining the effectiveness, acceptability, resource use and cost-effectiveness from both a migrant and an EU/EEA public health perspective are necessary (see online supplementary appendix 6, supplementary appendix 6 figure 1 and supplementary appendix 6 figure 2).

OBJECTIVE

The objective of this systematic review is to identify, appraise and synthesise the best available evidence on prevention and health assessment of selected infectious diseases among migrants to the EU/EEA. It will use a Cochrane-based approach and report on clinically important outcomes and Grading of Recommendations Assessment, Development and Evaluation (GRADE) summary of findings tables and cost-effectiveness of interventions.[36] We provide detailed key questions and outcomes for each of the disease reviews in the online supplementary appendices.

METHODS

The Cochrane methodological approach described in this protocol for evidence-based literature searching conforms to the PRISMA for systematic review protocols (PRISMA-P) as closely as possible.[10] This suite of systematic reviews aims to conduct systematic reviews and to inform ECDC public health guidance. We will update and enhance anchoring evidence-based migrant

evidence.[36] This protocol outlines the methods approach to the systematic review. This approach follows the new GRADE Adolopment Approach, a systematic guideline development approach that combines adoption, adaptation, and as needed de novo development of reviews to address elements of the GRADE evidence to decision (EtD) framework.[3 36–38]

Within this overall systematic review, there are six infectious diseases working groups, each one evaluating the evidence for one or more infectious disease topics. Each working group has developed key questions and prioritised clinically important outcomes. Groups then constructed a logic model considering children and adult migrant populations to explicitly outline the evidence pathway to guide the search and synthesis (see online supplementary appendices). All six subgroups will follow the review methods as described in this protocol. Each interdisciplinary group includes disease content experts, a European public health context expert and a GRADE methodologist; some groups include community organisations. The process is divided into four phases:

► Phase 1: conduct systematic review and appraisal of effectiveness reviews and evidence-based guidelines (ie, linked to systematic reviews).
► Phase 2: conduct systematic search and appraisal for economic evaluations on resource use and cost-effectiveness, on each topic.
► Phase 3: update systematic reviews of effectiveness: search for, select, appraise and synthesise new trials and systematic reviews to update the existing systematic review.
► Phase 4: supplement with de novo systematic reviews: we will conduct new focused systematic reviews if there is promising evidence but no existing systematic reviews on a critical topic or question. These searches will focus on randomised and non-randomised trials.

Phase 1: conduct a systematic review of reviews and guidelines

Eligible studies for this review will include systematic reviews that meet the criteria described in table 1. We will not apply a language restriction in this protocol, and when we identify more than one version of a systematic review, the most recent one will be considered.

Table 1	Eligibility criteria used for all diseases
Study characteristics	**Inclusion criteria**
Population	We will consider studies of any population, children and adults, which may be considered indirect evidence. We will use migrant data if available.
Interventions	Screening, treatment and vaccine prevention interventions and programmes for one of the selected diseases being evaluated.
Comparisons	No screening or prevention intervention/programmes comparison.
Outcomes	Reduction in morbidity or mortality including surrogate outcomes or disease transmission.
Study characteristics	Design: systematic reviews, defined as a review with selection criteria, and searching of at least one database.

Search strategy

An experienced health information specialist with expertise in systematic review searching will develop electronic literature search strategies in consultation with infectious disease working groups (see online supplementary appendix 7 for an example of a draft search strategy for one disease for one database). We will search Medline, Embase, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Epistemonikos and Cochrane Central. The literature search will be restricted to studies published from 1 January 2010 to present. Our group published migrant health guidelines based on systematic reviews in 2011,[6] and we will use these as anchoring evidence-based guidelines to supplement with new systematic review evidence. The search strategy will use a combination of indexed terms and free text words. Our previous searches[6] demonstrated that refugees and other migrants are under-represented in randomised controlled trials and other intervention research. Migrants represent a very heterogeneous international population. When appropriate, we will consider studies on high-risk migrant groups, but in estimating effectiveness of interventions we will also consider studies on general populations. Later as we develop guidance, we will also collect evidence as we study migrant values on outcomes, acceptability, feasibility and equity.

In addition, we will search grey literature for published guidelines and reports on screening and prevention programme on relevant organisations' websites (eg, Centers for Disease Control and Prevention (CDC), ECDC, The Joint United Nations Programme on HIV/ AIDS (UNAIDS), WHO). The literature search results will be uploaded to a reference manager software package, to facilitate the study selection process.

Study screening and selection

Prior to the screening process, the review teams will undergo an exercise to facilitate consistency in study selection. The trained reviewers will screen in duplicate and independently screen the titles and abstracts of all retrieved citations to identify the eligible reviews. The full texts of potentially eligible citations (systematic reviews) will then be retrieved and screened independently in duplicate. During the systematic review, citations that are not reviews will be catalogued so they are available if needed at a later stage. The reviewers will compare the results and resolve disagreement by discussion or with help of third reviewer. We will contact authors of reviews once for missing information. If the reviewers are unable to find a meta-analysis relevant to the research question, but do find relevant individual studies within the review, then they will consider assessing the studies for inclusion.

Data extraction

We will develop a standardised extraction sheet for each condition-specific subgroup. We anticipate some consistency across groups, especially with respect to how data are extracted, but there will be unique content aspects to each disease-specific data extraction as well. Prior to data extraction, reviewers will undergo a calibration exercise to ensure consistency. Teams of two reviewers will extract data in duplicate and independently. They will compare results and resolve disagreements by discussion or with help from a third reviewer. At a minimum we will extract (1) population, intervention, comparison and outcome elements of the research questions for interventional systematic reviews; (2) databases searched; (3) number of studies included in the systematic review; and (4) results (see online supplementary appendix 8 table 1). Data extraction will be modified if individual studies are found and included at this stage.

Risk of bias

We will assess the quality of the included systematic reviewers using the Scottish Intercollegiate Guidelines Network (SIGN 50) and 'A Measurement Tool to Assess the Methodological Quality of Systematic Reviews (AMSTAR)' tools (see online supplementary appendix 8 table 2).[39] Two reviewers will independently assess the quality in duplicate and disagreements will be resolved by discussion or using a third reviewer. We will also consider reporting of other forms of bias for systematic reviews of observational studies based on recommendations from the draft AMSTAR II (B Shea, personal communication, 2016). Quality assessment criteria will not be used to include or exclude studies but will be used to assess certainty in the findings. GRADE requires an assessment of the risk of bias. Information on the risk of bias for the individually included studies will be extracted according to the reporting in the included systematic reviews. Any individual studies will be assessed using Cochrane Risk of Bias tool or Newcastle-Ottawa Scale as appropriate.

Assessing the quality and certainty of the evidence

The GRADE criteria will be applied to assess the quality and certainty of evidence for the included studies. The rating is based on an assessment of (1) risk of bias (study limitation); (2) inconsistency (heterogeneity) in the direction and/or size of the estimates of effect; (3) indirectness of the body of evidence to the populations, interventions, comparisons and/or outcomes; (4) imprecisions of results (few participant/events/observations and/or wide CIs); and (5) other considerations (effect size and publication bias). The quality of evidence may be downgraded if there are serious or very serious concerns related to any of the GRADE criteria (see online supplementary appendix 8 table 3). All key data will be entered in the GRADEpro software. This software will be used to produce GRADE evidence profile tables and summary of findings tables. If relevant, we will use the GRADE-CERQual approach for summary of findings for outcomes for qualitative systematic reviews.[40–42]

Ranking of outcomes

In this protocol, we have identified and ranked all potential patient important outcomes (see online supplementary

appendix 8 table 4). Outcomes are ranked as critical, important but not critical, or limited importance for decision making. Only evidence on critical and important outcomes will be considered.

Phase 2: conduct a systematic search and selection for economic evaluations on resource use, costs and cost-effectiveness

We will use cost-effectiveness studies identified from phase 1, and a librarian scientist will systematically search for economic evidence including resource use, costs and cost-effectiveness studies using Medline and Embase relating to our priority interventions. In addition, two health economists will systematically search the National Health System Economic Evaluation Database, the Cost-Effectiveness Analysis Tuft's registry and Google Scholar databases for economic studies. A sample PRISMA flow chart is provided for economic studies for TB (see online supplementary appendix 9). The health economists will screen the results for systematic reviews and primary studies of resource use, costs or cost-effectiveness of screening and treating each of the priority infectious diseases, then independently screen the full-text articles and assess the systematic reviews for quality using AMSTAR. Studies will not be excluded on the basis of AMSTAR scores. Data will be independently extracted from primary studies of resource use, costs or cost-effectiveness aligned with the disease group's aims, including GRADE EtD considerations around size of resource requirements, certainty of evidence of resources and cost-effectiveness favouring the intervention or comparator. A one-page narrative summary of the economic evidence will be written, and evidence about the resource use and costs will be incorporated into the GRADE evidence profiles and summary of findings tables where appropriate.[43]

As economic evidence has not previously been reported in guidelines, we will systematically search all databases from inception to June 2016. Two reviewers will independently select, appraise and extract data. In case of disagreement, we will use discussion or a third reviewer. Evidence will be summarised for each of the infectious disease conditions. We will use AMSTAR for quality assessment of systematic reviews and GRADE to appraise certainty of evidence in the primary economic evaluations.

Phase 3: update systematic reviews of effectiveness

We will search for, select, appraise and synthesise new prospective trials and systematic reviews to update the existing systematic reviews. We will use the same search strategies as used in phase 1, but will consider trials as well as systematic reviews. We will search for intervention effectiveness dating 1 year prior to the publication of the most recent systematic reviews. We will appraise and evaluate the new evidence and we will integrate new evidence into the evidence summaries when feasible.

Phase 4: supplement with de novo systematic reviews

If no reviews are identified in phase 1 to address a critical disease or care delivery question, then a new systematic review will be performed to develop the guidance. Studies identified in this stage will be evaluated and synthesised using similar methods described previously. We will conduct a quality assessment using tools designed for individual studies, such as the Cochrane Risk of Bias tool for randomised trials[44] or the Newcastle-Ottawa Scale for non-randomised studies.[45] We will not use quality as sole eligibility criteria.

When possible, we will conduct a meta-analysis as part of the creation of GRADE summary of findings table. When not appropriate due to high levels of heterogeneity, we will synthesise and report the evidence using a narrative summary of findings format. The objective will be to report on the preselected benefits and harms associated with the interventions of interest.

Developing guidance using evidence

All existing evidence selected and synthesised for interventions, including both benefits and harms, will be identified as evidence for GRADE summary of findings tables. We will select the most recent, the most relevant (based on European context and our logic model and questions) and the highest quality evidence. Evidence will come from systematic reviews and cost-effectiveness studies updates with randomised controlled trials. Where important gaps exist, we will address them with focused de novo systematic reviews.

DISSEMINATION

We will publish the separate systematic review in an open-access journal for public health stakeholders and/or the GRADEpro database of evidence profiles (dbep. gradepro.org). We will make the results available to panels of experts to use the evidence to develop international guidelines for migration. ECDC will publish a technical report, and we plan to submit a final guideline summary paper to a European clinical journal, for example, the *British Medical Journal*. We will use the ECDC, the International Conference on Ethnicity, Race and Migrant Health, our Campbell and Cochrane Collaboration Equity Methods website, and other social media to push out results.

DISCUSSION

During the past 50 years, many national and some international disease detection and control, immunisation, and communicable disease prevention strategies have been successful. Refugees and other migrants originating from countries with a high infectious disease burden could pose a challenge for national disease control and/or elimination strategies. Evidence-based guidelines are required to guide public health, non-governmental organisations and clinical sectors in the assessment and prevention of

infectious diseases for child and adult migrants to Europe. The results of our systematic review(s) will be of interest to a broad group of stakeholders, including policymakers, healthcare practitioners and members of international health organisations. Accessing and summarising the data using explicit, consistent and transparent methods provide a foundation for public health policy and guidelines.[6] High-quality synthesis and dissemination of the evidence and updating and enhancing the 2011 systematic review[6] will support a more coordinated approach to voluntary screening and treatment of infectious diseases in migrants in EU/EEA Member States. Our reviews will facilitate evidence-based management of migrants with the studied infectious diseases, and will likely identify key areas for future research, and provide a framework for conducting overviews of systematic reviews on causation.

We will use the evidence from these reviews to inform GRADE EtD criteria.[38–42 46] These EtD summaries will also include data on migrants' preferences, stakeholder acceptability and feasibility and health equity. These summaries will support an ECDC scientific panel in developing guidance statements on infectious diseases for newly arriving migrants to the EU/EEA. Details on GRADE EtD methods process will be published separately.

CONCLUSIONS

In this protocol, we detail a suite of linked systematic reviews of infectious disease conditions that may benefit from assessment for newly arriving child and adult migrants. The four-phase approach aims to identify, appraise and update existing systematic reviews, and identify critical gaps leading to opportunities for syntheses and de novo reviews. This review will provide high-quality evidence for the forthcoming ECDC Evidence-Based Guidance on Prevention and Assessment of Infectious Diseases for Migrants to the EU/EEA .

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REFERENCES

1. International Organisation for Migration (IOM). Migrants and Cities: new partnerships to manage mobility. 2015 http://www.iom.int/world-migration-report-2015 (accessed Mar 2017).
2. Migrant integration Policy Index (MIPEX 2015). http://www.mipex.eu (accessed Mar 2017).

3. Migrant Health Assessment Sub-committee of HPSC Scientific Advisory Committee. Infectious disease Assessment for Migrants Toolkit. Health Protection Surveillance Centre. 2015 http://www.hpsc. ie/A-Z/SpecificPopulations/Migrants/ (accessed Sep 2016).

4. Rechel B, Mladovsky P, Ingleby D, et al. Migration and health in an increasingly diverse Europe. *Lancet* 2013;381:1235–45.

5. Zimmerman C, Kiss L, Hossain M. Migration and health: a framework for 21st century policy-making. *PLoS Med* 2011;8:e1001034.

6. Pottie K, Greenaway C, Feightner J, et al. Evidence-based clinical guidelines for immigrants and refugees. *CMAJ* 2011;183:E824–E925.

7. Chaves NJ, Paxton G, Biggs BA, et al. Recommendations for comprehensive post-arrival health assessment for people from refugee-like backgrounds. Australasian Society for infectious diseases and Refugee Health Network of Australia. 2nd edition, 2016. https://www.asid.net.au/documents/item/1225. (accessed Mar 2017).

8. Pottie K, Batista R, Mayhew M, et al. Improving delivery of primary care for vulnerable migrants: Delphi consensus to prioritize innovative practice strategies. *Can Fam Physician* 2014;60:e32–e40.

9. European Centre for Disease Prevention and Control. Expert Opinion on the public health needs of irregular migrants, refugees or asylum seekers across the EU's southern and south-eastern borders. 2015 http://ecdc.europa.eu/en/publications/_layouts/forms/Publication_DispForm.aspx?List=4f55ad51-4aed-4d32-b960-af70113dbb90&ID=1377 (accessed Sep 2016).

10. Moher D, Shamseer L, Clarke M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015;4:1 https://systematicreviewsjournal. biomedcentral.com/articles/.

11. World Health Organization. Global tuberculosis report 2015. 2015 http://www.who.int/tb/publications/global_report/en/ (accessed Sep 2016).

12. World Health Organization. WHO end TB strategy. 2015 http://www. who.int/tb/post2015_strategy/en/ (accessed Sep 2016).

13. World Health Organization. *Global tuberculosis control: surveillance, Planning, Financing*. Geneva: World Health Organization, 2008.

14. European Centre for Disease Prevention and Control and WHO Regional Office for Europe. Tuberculosis surveillance and monitoring in Europe. 2015 http://ecdc.europa.eu/en/publications/Publications/ tuberculosis-surveillance-monitoring-Europe-2015.pdf (accessed Sep 2016).

15. Pareek M, Baussano I, Abubakar I, et al. Evaluation of immigrant tuberculosis screening in industrialized countries. *Emerg Infect Dis* 2012;18:1422–9.

16. Pareek M, Greenaway C, Noori T, et al. The impact of migration on tuberculosis epidemiology and control in high-income countries: a review. *BMC Med* 2016;14:48.

17. European Centre for Disease Prevention and Control. Guidance on tuberculosis control in vulnerable and hard-to-reach populations. 2016 http://ecdc.europa.eu/en/publications/_layouts/forms/ Publication_DispForm.aspx?List=4f55ad51-4aed-4d32-b960- af70113dbb90&ID=1451 (accessed Sep 2016).

18. World Health Organization. HIV/AIDS 2016. 2016 http://www.who.int/ mediacentre/factsheets/fs360/en/ (accessed Sep 2016).

19. European Centre for Disease Prevention and Control. HIV/AIDS surveillance in Europe. 2015 http://ecdc.europa.eu/en/publications/ surveillance_reports/hiv_sti_and_blood_borne_viruses/pages/hiv_ aids_surveillance_in_europe.aspx (accessed Sep 2016).

20. Hamers FF, Phillips AN. Diagnosed and undiagnosed HIV-infected populations in Europe. *HIV Med* 2008;9:6–12.

21. Alvarez-del Arco D, Monge S, Azcoaga A, et al. HIV testing and counselling for migrant populations living in high-income countries: a systematic review. *Eur J Public Health* 2013;23:1039–45.

22. Alvarez-Del Arco D, Monge S, Caro-Murillo AM, et al. HIV testing policies for migrants and ethnic minorities in EU/EFTA Member States. *Eur J Public Health* 2014;24:139–44.

23. World Health Organization. Hepatitis B. 2016 http://www.who.int/ mediacentre/factsheets/fs204/en/ (accessed Sep 2016).

24. European Centre for Disease Prevention and Control. Epidemiological assessment of hepatitis B and C among migrants in the EU/EEA. 2016 http://ecdc.europa.eu/en/publications/ Publications/epidemiological-assessment-hepatitis-B-and-C-among- migrants-EU-EEA.pdf (accessed Sep 2016).

25. European Centre for Disease Prevention and Control. Hepatitis B and C in the EU neighbourhood: prevalence. *burden of disease and screening policies* 2010 http://ecdc.europa.eu/en/publications/ publications/ter_100914_hep_b_c%20_eu_neighbourhood.pdf (accessed Sep 2016).

26. European Centre for Disease Prevention and Control. Hepatitis B and C surveillance in Europe. 2012 http://ecdc.europa.eu/en/ publications/publications/hepatitis-b-c-surveillance-europe-2012- july-2014.pdf (accessed Sep 2016).

27. World Health Organization. Hepatitis C. 2016 http://www.who.int/ mediacentre/factsheets/fs164/en/ (accessed Sep 2016).

28. European Centre for Disease Prevention and Control. Surveillance and prevention of hepatitis B and C in Europe. 2010 http://ecdc. europa.eu/en/publications/publications/101012_ter_hepbandc_ survey.pdf (accessed Sep 2016).

29. World Health Organization. Immunization coverage. 2016 http://www. who.int/immunization/monitoring_surveillance/routine/coverage/en/ (accessed Sep 2016).

30. World Health Organization. Polio vaccines and polio immunization in the pre-eradication era: WHO position paper--recommendations. *Vaccine* 2010;28:6943–4.

31. World Health Organization. Pertussis vaccines: WHO position paper-- recommendations. *Vaccine* 2011;29:2355–6.

32. World Health Organization. Rubella vaccines: WHO position paper-- recommendations. *Vaccine* 2011;29:8767–8.

33. World Health Organization. Measles vaccines: who position paper. *Wkly Epidemiol Rec* 2009;84:349–60.

34. Pottie K, Hui C, Rahman P, et al. Building sustainable health systems for refugees, migrants and populations affected by migration: an International Delphi Consensus. *Int J Environ Res Public Health* 2017;14:144.

35. European Centre for Disease Prevention and Control. Rapid risk assessment: local transmission of schistosoma haematobium in Corsica, France. 2014 http://ecdc.europa.eu/en/publications/ Publications/risk-assessment-Schistosoma%20haematobium- Corsica-update_TOR1N6.pdf (accessed Sep 2016).

36. Tugwell P, Pottie K, Welch V, et al. Canadian Collaboration for Immigrant and Refugee Health (CCIRH). Evaluation of evidence- based literature and formulation of recommendations for the clinical preventive guidelines for immigrants and refugees in Canada. *CMAJ* 2011;183:E933–E938.

37. Meerpohl J. Ad-o-lopment of guidelines: a way forward for Croatia. 2015 http://croatia.cochrane.org/sites/croatia.cochrane.org/files/ uploads/7Crocos/CroCoS7_Meerpohl.pdf (accessed Sep 2016).

38. Schünemann H. GRADE: what does it offer to Guideline Producers? DECIDE project conference. *Scotland* 2014 http://www.decide- collaboration.eu/sites/www.decide-collaboration.eu/files/public/ uploads/140602%204%20Holger%20Schunemann.pdf (accessed Mar 2017).

39. Shea BJ, Grimshaw JM, Wells GA, et al. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. *BMC Med Res Methodol* 2007;7:10.

40. Alonso-Coello P, Oxman AD, Moberg J, et al. GRADE Evidence to Decision (EtD) frameworks: a systematic and transparent approach to making well informed healthcare choices. 2: Clinical practice guidelines. *BMJ* 2016;353:i2089.

41. Alonso-Coello P, Schünemann HJ, Moberg J, et al. GRADE Evidence to Decision (EtD) frameworks: a systematic and transparent approach to making well informed healthcare choices. 1: Introduction. *BMJ* 2016;353:i2016.

42. Andrews JC, Schünemann HJ, Oxman AD, et al. GRADE guidelines: 15. Going from evidence to recommendation-determinants of a recommendation's direction and strength. *J Clin Epidemiol* 2013;66:726–35.

43. Brunetti M, Shemilt I, Pregno S, et al. GRADE guidelines: 10. Considering resource use and rating the quality of economic evidence. *J Clin Epidemiol* 2013;66:140–50.

44. Higgins JP, Altman DG, Gøtzsche PC, et al. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ* 2011;343:d5928.

45. Wells GA, Shea B O'Connell, et al. The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta- analyses. 2014 http://www.ohri.ca/programs/clinical_epidemiology/ oxford.asp (accessed Oct 2016).

46. Rayess AZ, Wiercoch W. A new approach to CPG adaptation in Saudi Arabia: adaptation of practice guidelines to a country-specific context using the GRADE/DECIDE evidence to decision framework. *GIN Conference. Melbourne* 2014 http://www.decide-collaboration. eu/sites/www.decide-collaboration.eu/files/public/uploads/140822_ CPG_Friday%20Rm%20104%201100%20Zulfa%20Al%20Rayess- 1.pdf (accessed Mar 2017).